U. S. Government

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May 20, 1964
Vol. 39 No. 10

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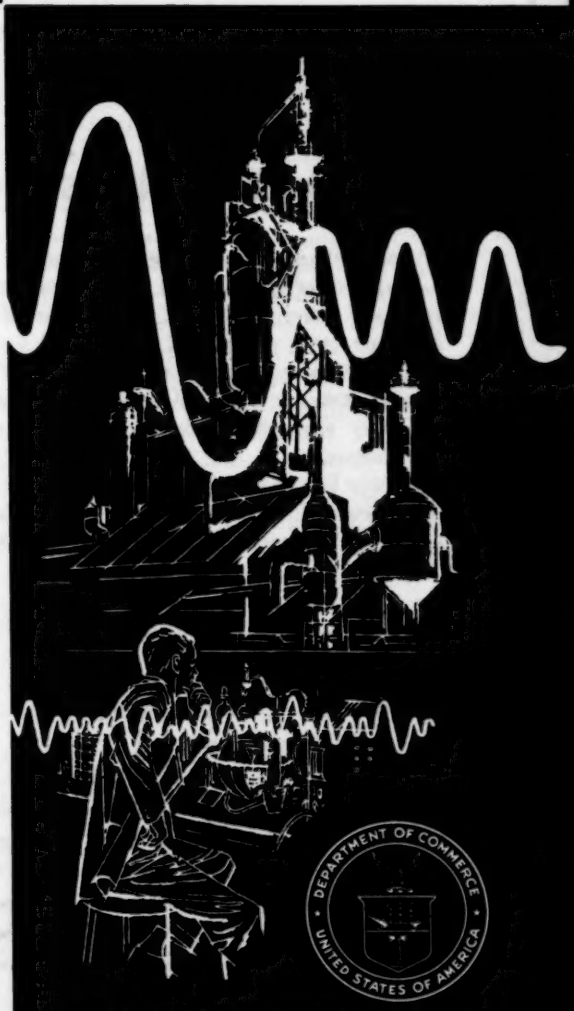

U. S. DEPARTMENT OF COMMERCE

Office of Technical Services

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

OFFICE OF TECHNICAL SERVICES
Donald A. Schon, Director

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Cincinnati, Ohio 45200

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Detroit, Michigan 48200

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Salt Lake City, Utah 84100

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TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-431 264 Div. 1
OTS price $1.60

Air Force Special Air Warfare Center, Eglin Air Force Base, Fla.
EVALUATION OF GEISS ANTI-GROUNDLOOP LANDING GEAR ON CESSNA 01-E (L-19) AIRCRAFT,
by H. J. Carlile. Dec 63, 18p.
Proj. 2F13
AFSAWC TDR63 26 Unclassified report

Descriptors: (*Observation planes, Landing gear), (*Landing gear, Aviation safety), Take-off, Airplane landing, Aviation accidents, Design, Tests.

An evaluation was initiated to determine the effectiveness of the Geiss anti-groundloop landing gear on the Cessna 01-E (L-19) aircraft. This gear is designed to assist pilots in preventing groundloops and to reduce the amount of aircraft damage when groundloops occur. Three-hundred takeoffs and landings were made with a Cessna 01-E aircraft equipped with the Geiss landing gear. Poor pilot techniques were intentionally utilized to simulate student operation. One-half of the landings were made on sod runways and the other half were accomplished on concrete runways. On 250 landings proper recovery techniques were utilized when groundloops became imminent. No inadvertent groundloops occurred. Fifty intentional groundloops were performed. One-half of the groundloops were accomplished on concrete runways and one-half were performed on sod runways. The airspeed at groundloop inception was 35 MPH IAS or below. The aircraft was not allowed to leave the smooth landing area. The aircraft equipped with the Geiss gear did not sustain any major damage during these 50 groundloops. Use of the Geiss gear did not induce any detectable aircraft handling problems, either in flight or on the ground. The complete Geiss gear installation weighs less than eight pounds and the cost of the item, as quoted by the contractor at the time of this evaluation, was approximately $250 per aircraft. (Author)

AD-431 566 Div. 1, 9
OTS price $5.60

Princeton U., N. J.
SOME DYNAMIC ASPECTS OF STABILITY IN LOW-SPEED FLYING MACHINES,
by Theodor A. Dukes, Jose M. Carballal and Paul M. Lion. Nov 63, 59p.
Contract DA44 177tc835, Task 1D121 401A142 03
ATRECOM TR63 56 Unclassified report

Descriptors: (*Vertical take-off planes, Adaptive control systems), (*Flight control systems, Vertical take-off planes), Stability, Pitch (Motion), Feedback, Damping, Differential equations, Mathematical analysis, Analog computers, Time, Programming (Computers), Linear systems, Subsonic characteristics.

This report is concerned with a linear time varying approximation to the dynamics of low-speed flying machines. Simplifications and approximations are applied widely in order to emphasize essential aspects. The range of time variation is described in terms of frozen system loci of the roots corresponding to the predominant mode of a system. The rate of the time variation is described in terms of the deviation from the frozen system approximation. An analog computer study was made to specify quantitatively those rates of time variation which cannot be considered as slow. The longitudinal dynamics of VTOL aircraft is studied as an example in rather general terms. Approximations and the application of root locus methods in terms of the most significant stability derivatives lead to a construction describing the behavior of the oscillatory roots during transition. The results are used in a discussion of the following variable feedback configurations: direct feedback adjustments, adaptive feedback, and programmed feedback adjustments. (Author)

AD-431 748 Div. 1, 8
OTS price $8.60

General Electric Co., Johnson City, N. Y.
FAILURE - CORRECTING FLIGHT CONTROL SYSTEM. PHASE I.
Final rept.,
by B. S. Chamberlain and F. C. Neebe. May 63, 99p. Rept. no. 63APJ13
Contract Now62 0622d
Unclassified report

Report on Feasibility Study Devoted to Principles and Practicality of an Approach to Develop the Concepts of Failure-Correcting Techniques Applied to Automatic Flight Control Systems.

Descriptors: (*Jet fighters, Flight control systems), (*Flight control systems, Feasibility studies), Naval aircraft, Automatic, Failure, Corrections, Control systems, Analog-to-digital converters, Digital systems, Design, Stability, Attitude control systems, Terrain avoidance, Carrier landings, Feedback, Redundant components.

A feasibility study devoted to principles and practicality of an approach to develop the concepts of failure-correcting testniques applied to automatic flight control systems. A failure-correcting rate controller was designed, and a breadboard model was fabricated and evaluated. The results of a closed loop evaluation illustrated that automatic failure correction is definitely feasible. It further illustrated that, when introducing or removing a fault, the system can be made to exhibit a minimum control transient. Since triple redundancy yields such large increases in system reliability, the fabrication and flight test evaluation of a flyable three-axis flight control system is recommended. (Author)

Division 1 - AIRCRAFT AND FLIGHT EQUIPMENT

AD-431 826 Div. 1, 25, 30
OTS price $1.50

Aeronautical Research Inst. of Sweden.
ANALYSIS OF THE PROBABILITY OF COLLAPSE OF A FAIL-SAFE AIRCRAFT STRUCTURE CONSISTING OF PARALLEL ELEMENTS.
Final rept..
Feb 64, 59p. HU961
Contract AF61 052 573, Proj. 1467, Task 146704
RTD TDR63 4210 Unclassified report

Reprint on structural analysis methods.

Descriptors: (*Aircraft, Fatique (Mechanics)), (*Structures, Falilue (Mechanics), Probability, Fracture (Mechanics), Loading (Mechanics), Life expectancy, Maintenance, Medry, Gust loads, Numerical methods & procedures, Airframes.

A study is made of the probability of collapse of a fail-safe structure, consisting of a number of parallel members, subjected to a random load spectrum. In the individual members a fatigue crack

first initiated and failure of the members occurs due to a heavy load on the weakened members. The probability of element failure is obtained by a combination of the probabilities of crack initiation and of meeting a load exceeding the residual strength of the member. The probability of consecutive element failures is deduced from the probability of failure of the individual members. Collapse occurs when all members are broken, or, in practice, after a critical number of element failures. The probability of collapse of the assembly during the whole service life is the sum of the probabilities of all the inspection intervals. A numerical procedure for calculating the probability of collapse was developed and evaluations were made for an assembly of six identical, parallel members. Diagrams of the probability of collapse P versus the service life time T are plotted for various lengths of regular inspection intervals, assuming different values of the crack initiation and strength reduction parameters introduced. (Author)

AD-431 865 Div. 1
OTS price $1.60

McDonnell Aircraft Corp., St. Louis, Mo.
AXIAL COMPRESSION TEST - UPPER TORQUE BOX SKIN WHEEL BUMP FAIRING.
Final rept.
10 Mar 64, 13p. Rept. no. A487
Contract AF33 657 11215
Unclassified report

Descriptors: (*Fairings, Environmental tests), Aerodynamic heating, Airplane panels, Landing gear, Supersonic characteristics, Vehicle wheels, Degradation, Structures, Joints, Glass textiles, Materials, Aluminum, Test methods, Synthetic rubber, Rubber coating.

A 53-010001 wheel bump fairing test panel was subjected to a hot air blast which produced temperatures of 275 to 305F (at the surface), and dynamic pressures of 15 psig. An air blast was directed to the EC 1675 and fiberglass fairing juncture, and to the aluminum-filled fairing compound and the skin juncture. Each juncture was subjected to 25 cycles of combined heating and air blast and cooled to 100F between cycles. No significant damage occurred in either of the areas. (Author)

AD-431 914 Div. 1
OTS price $21.00

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF A GROUND-BOUNCE RANGING/ALTITUDE EXCHANGING COLLISION AVOIDANCE SYSTEM TECHNIQUE.
Final rept.,
by Bernhart V. Dinerman and Karl Burkard. Oct 63, 362p.
Proj. 110 501X
NAFEC RD64 5 Unclassified report

Descriptors: (*Aviation safety, Air-to-air), (*Radio navigation, Aviation safety), Ranges (Distance), Radio altimeters, Radio beacons, Radar beacons, Identification systems, Radar receivers, Omnidirectional antennas, Dipole antennas, Transport planes, Warning systems, Radar navigation, Radar reflections, Flight paths, Data.

A range/range-rate collision prediction technique, implemented in a breadboard collision avoidance system (CAS), was investigated. The CAS was installed in two JC-131 aircraft, and the effects of terrain and relative velocity on system performance were evaluated during parallel, ascending, descending, divergent, and near collision flights over water, flat land, mountains, and cities. The purposes of the evaluation were to determine capabilities of the system concept, determine limitations of the range/range-rate (tau) technique, and provide data for direction of further development effort. The airborne test results confirm the validity of a collision avoidance technique based upon the tau relationship. However, when range data are derived by the ground reflection technique, inaccuracies due to irregular terrain contour result in false alarms and missed alarms. The principal recommendation is that the tau technique be seriously considered for further application in any new development of a collision avoidance system. (Author)

AD-432 408 Div. 1, 18, 24
OTS price $4.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION OF F-100/F-105 CAPABILITY, TACTICS AND TECHNIQUES FOR AERIAL DELIVERY OF PHOTOGRAPHIC PRINTS.
Feb 64, 48p.
TAC TR63 32 Unclassified report

Descriptors: (*Air drop operations, Aerial photographs), (*Jet fighters, Air drop operations), Photographic film, Flight testing, Feasibility studies, Compatibility, Recovery, Configuration, Release mechanisms, Test methods, Tests, Rocket launchers, Containers, Parachutes.

During July 1963, flight tests were performed by the USAF Fighter Weapons School (TR&D Division), Nellis AFB, Nevada, to develop a system for the aerial delivery of photographic prints from the F-100 and F-105 type aircraft. The test was performed in three phases - functional, ballistic, and tactics and technique phase - which consisted of a total of sixty-one drops. The finalized aerial delivery system consisted of a modified dart target recovery chute canister with the pilot chute of an F-105 drag chute attached. A modified LAU-10/A Zuni Rocket Launcher was used to carry and launch the delivery containers. The aerial delivery system was successful up to 400 KIAS at a minimum release altitude of 50 feet. Optimum drop conditions are 300 to 350 KIAS at a release altitude

of 50 to 100 feet above ground level. Releases within these conditions assure recoverability and reusability of the delivery containers. Present low-level weapons delivery techniques are applicable for releasing the delivery containers from both the F-100 and the F-105D. (Author)

AD-432 624 Div. 1
OTS price $9.10

Hughes Tool Co., Culver City, Calif.
INVESTIGATION OF ADJUSTABLE TIP WEIGHTS FOR IMPROVEMENT OF HELICOPTER STABILITY THROUGH INCREASED DAMPING,
by R. J. Sullivan and J. D. Eakin. 23 May 63, rev. 28 Dec 63, 108p. Rept. no. AD63 16
Contract NOw62 0313t
Task 62 2
Unclassified report

Descriptors: (*Helicopters, Stability), (*Helicopter rotors, Damping), Pitch (Motion), Roll, Rotor blades (Rotary wings), Hovering, Weight, Feasibility studies.

AD-432 687 Div. 1
OTS price $1.60

Army Frankford Arsenal, Philadelphia, Pa.
IMPROVEMENT OF LAP BELT TIGHTENER,
by F. T. Pisano. Feb 64, 20p.
DA Proj. 502 06 001
AFA M64 23 1 Unclassified report

Descriptors: (*Safety harness, Locking fastener devices), (*Cardridges (PAD), Safety harness), Couplings, Safety devices, Explosive actuators, Configuration, Design, Test methods, Aviation safety, Acceptability, Pilot seats.

Analytical and design studies were conducted on the aircraft lap belt tightener mechanism. Substitution of a ball type initial lock mechanism for the Belleville spring increased the lap belt tightener tension load capacity and use of a high strength material increased the loop load capacity. A minor configuration change in the piston locking mechanism provided more reliable operation. In the final ballistic tests, the M67 cartridges were substituted for the M75. The M67 cartridge generated the desired gas pressure in the system and operated the lap belt tightener within the specified limits. (Author)

AD-433 020 Div. 1
OTS price $1.00

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COMPARISON OF APPROACHES FOR SONIC FATIGUE PREVENTION,
by Maurice J. Cote. Sept 63, 31p.
ASD TDR63 704 Unclassified report

Presented at the ASD 1963 Science and Engineering Symposium, 18-19 Sep 1963, at Wright-Patterson Air Force Base, Ohio.

Descriptors: (*Sonic fatigue, Life expectancy), Airframes, Test methods, Jet planes, Jet engine noise, Countermeasures.

Exploratory development on sound-induced fatigue of flight vehicle structures has brought about numerous and varied approaches for the prevention of sonic fatigue. They range from purely theo9etical techniques for designing the structures to full scale proof testing of a flight vehicle. A generalized approach to prevention of sonic fatigue is presented which enumerates the necessary steps needed for the required prediction of fatigue life. Five approaches are summarized where two approaches are primarily concerned with designing the initial structure with a satisfactory fatigue life. The other three approaches are to determine the fatigue life of structural designs by experimental tests prearranged to be representative of the true environments. The structural designs are modified and improved to meet the necessary fatigue life requirements, thus preventing sonic fatigue during their expected normal service life. These approaches are compared on the basis of their assumptions for true environment representation, verification and complexity of analytical and experimental procedures and results. (Author)

AD-433 236 Div. 1, 9
OTS price $4.60

Springfield Armory, Mass.
ANALYSIS OF LUG AND SWAY-BRACE REACTIONS FOR THE XM75 AIRCRAFT POD,
by David A. Poole. 24 June 63, 42p.
SA SA TR20 9210 Unclassified report

Descriptors: (*Aircraft protuberances, Loading (Mechanics)), (*External stores, Attachment), Weight, Maintenance, Weapons, Aerodynamic loads, Mathematical analysis, Launching, Aircraft equipment, Armament, Equations, Mechanical properties, Structures, Structural parts, Structural properties, Stresses, Suspension devices, Supports.

The maximum theoretical loads at the attachment points of the XM75 aircraft pod were determined. The load analysis was conducted to obtain data for various flight maneuvers and launcher loads. Additional guidance beyond that provided in the referenced documents was established. The magnitude of the individual loads, the derivations of the pod reaction equations, and the sway-brace reactions are included. Mathematical procedure is given and results are discussed. (Author)

AD-433 157 Div. 1
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE ''AMUR'' GLIDER,
by V. Zamyatin and V. Spivak. 3 Feb 64, 12p.
FTD TT63 1147 Unclassified report

Trans. from Krylya Rodiny, no. 9, pp. 17-19, 1962.

Descriptors: (*Gliders, Aerodynamic characteristics), Flight testing, Airframes, Flight control systems, Performance (Engineering), Recreation.

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-431 521 Div. 2
OTS price $1.60

Harvard Coll. Observatory, Cambridge, Mass.
THE EVOLUTION OF SOLAR PROMINENCES AND MAGNETO-HYDROSTATIC MODELS OF THE SOLAR CORONA,
by Donald H. Menzel and Lowell R. Doherty.
Feb 64, 10p. Scientific rept. no. 27
Contract AF19 604 4962, Proj. 7649, Task 764901
AFCRL 64 207 Unclassified report

Reprint from Solar Corona, pp. 159-160 and 307-314, 1963. (Copies also available from DDC)

Descriptors: (*Solar corona, Energy), Hydrogen, Helium, Magnetic fields, Mathematical models, Magnetohydrodynamics.

AD-431 550 Div. 2
OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
AN INVESTIGATION OF THUNDERSTORM DISTRIBUTION OVER EXTENSIVE AREAS,
by Roy H. Blackmer, Jr. Nov 63, 64p. SR2
Contract AF19 628 1681, SRI Proj. 4304
AFCRL 63 910 Unclassified report

Descriptors: (*Thunderstorms, Distribution), (*Meteorological phenomena, Air mass analysis), Meteorological charts, Radar echo areas, Photographs, Clouds, Meteorological satellites, Diurnal variations, Periodic variations.

The results of investigations of the probable distributions of thunderstorms over extensive areas are presented. In this investigation various types of available data on the occurences of thunderstorms have been examined. Climatological records of the distribution of thunderstorm days show general areas of maxima and minima of thunderstorm activity and monthly fluctuations of these areas. Surface synoptic charts provide some knowledge of the locations of thunderstorm activity at a given time within the limitations of observational density. A comparison of a series of such charts at 0000 GMT with those at 1200 GMT illustrates that useful knowledge of diurnal variation in thunderstorms over an area can be deduced from the charts. Charts at more frequent intervals are essential, however, for completely describing the diurnal cycle. The utilization of photographic records to describe in detail the distribution of cloud cover over extended areas is discussed. The photographic data considered in this report were photographs of cloud cover from U-2 aircraft and TIROS satellites, and radarscope photographs of the precipitating regions of convective clouds. These data illustrate the tendency for convective activity to form in lines although the line configuration is sometimes difficult to identify in the TIROS photographs. (Author)

AD-431 604 Div. 2, 13, 32
OTS price $10.50

Franklin Inst., Philadelphia, Pa.
SOIL THERMAL PROPERTIES: AN ANNOTATED BIBLIOGRAPHY,
by Alec Peters and Norman Gentieu. Oct 62, 135p.
Contract OCD OS62 58
Unclassified report

Descriptors: (*Soils, Bibliographies), Soil mechanics, Moisture, Moistureproofing, Underground structures, Shelters, Thermal conductivity, Surface temperatures, Heat transfer, Thermal diffusion, Design.

Contents: Measurement techniques, Thermal properties, Moisture, and Design of underground structures.

AD-431 607 Div. 2
OTS price $8.10

Washington U., Seattle.
COLUMBIA RIVER EFFLUENT IN THE NORTHEAST PACIFIC OCEAN, 1961, 1962: SELECTED ASPECTS OF PHYTOPLANKTON DISTRIBUTION AND PRODUCTION,
by George C. Anderson. Dec 63, 85p. Rept. no. TR96; Ref. M63 50
Contract Nonr47710, Proj. NR083 012
Unclassified report

Descriptors: (*Plankton, Distribution), Growth substances, Hydrographic surveying, Photosynthesis, Chlorophylls, Climatology, Solar radiation, Oceans, River currents, Oceanology, Tracer studies, Carbon, Isotopes, Nutrition, Marine biology.

The distribution of chlorophyll (a) and phytoplankton productivity off the Washington and Oregon coasts has been observed during 14 cruises from January, 1961 to June, 1962. Suface waters in the area covered by the Columbia River effluent generally contained more phytoplankton and had a higher rate of photosynthesis than ambient waters. The densest and most variable populations were found during summer in coastal upwelling areas and directly off the river mouth. Although there was little seasonal change in standing stock, production was quite variable with minima in winter and summer and a large spring bloom and lesser autumn pulse. The major influence of Columbia River water on phytoplankton production appeared to be in the timing of events in the seasonal cycle. Phytoplankton development was noticeably affected by differences in the depth of the mixed layer and the sharp pycnocline during summer. The seasonal variation of C-14 - chlorophyll (a) uptake ratios was marked. Low values occurred during wnter with a maximum during the spring bloom. 'Dead' or inactive chlorophyll appeared to be negligible at all times, judging from regressions of these relationships. (Author)

AD-431 608 Div. 2, 32
OTS price $6.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
WIND WAVES AND SEA SLOPE MEASUREMENT: AN ANNOTATED BIBLIOGRAPHY,
comp. by Peter R. Stromer. July 63, 61p. Rept. no. 6 90 63 78; SRB63 4
Unclassified report

Descriptors: (*Water waves, Bibliographies), Wind, Aerial photography, Light, Light transmission, Ocean waves, Oceanology, Underwater light, Underwater photography, Wind tunnels

This bibliography cites 134 references on the related subjects of wind waves and sea slope measurement. Oceanographic measurements reported in the bibliography have emphasized optical techniques, light transmission in sea water, etc. The period of literature coverage is from 1948 through June 1963. (Author)

AD-431 613 Div. 2, 4
OTS price $.75

Washington U., Seattle.
THE SPECTROPHOTOMETRIC DETERMINATION OF AMMONIA AND LABILE AMINO COMPOUNDS IN FRESH AND SEAWATER BY OXIDATION TO NITRITE.
by Francis A. Richards and Richard A. Kletsch.
Jan 64, 22p. Technical rept. no. 97, Ref. no. M63 53
Contracts Nonr477 10, NSF G19784, Proj. NR083 012

Unclassified report

Descriptors: (*Sea water, Distillation), (*Amino acids, Sea water). Determination, Water, Ammonia, Spectrophotometers, Oxidation, Nitrites, Bases (Chemistry), Calorimeters, Bromides, Catalysts, Iodides.

A new method has been developed for the determination of small concentrations of ammonia and labile amino compounds in distilled, fresh, and seawater. It employs the oxidation of these compounds to nitrite by sodium hypochlorite in strongly basic solution. The excess sodium hypochlorite is reduced with sodium arsenite solution, and the nitrite is then determined by a calorimetric method. Bromide and iodide ions catalyze the oxidation. The precipitation of calcium and magnesium hydroxide from seawater samples by the base does not interfere with the determination. (Author)

AD-431 652 Div. 2, 15
OTS price $6.60

Chicago U., Ill.
A NUMERICAL COMPUTATION OF THE STORM SURGE OF HURRICANE CARLA 1961 IN THE GULF OF MEXICO,
by Masamori Miyazaki. Nov 63, 70p. Technical rept. 10
Grant WBG18

Unclassified report

Descriptors: (*Hurricane tracking, Mathematical prediction), Weather forecasting, Tropical cyclones, Storms, Wind, Pressure, Boundary value problems, Energy.

The storm surge of hurricane Carla 1961 in the Gulf of Mexico is computed by numerical integration of the dynamical equations. Input data consist of sea-level distributions of observed wind and pressure at six-hour intervals throughout the three-day period selected for the study. The computation is carried out in two steps. The first is on a rough mesh (mesh length 48 nautical miles) for the entire Gulf; bottom friction is disregarded in this step. The second is a fine-mesh computation (mesh length 9.6 nautical miles) on the northwestern continental shelf, where the storm surge was most prominent. Quadratic bottom friction is assumed in the latter step. The fine-mesh region is chosen so as to give good resolution in the neighborhood of Galveston, Texas. Computed variations of sea level are in good agreement with tide-gage observations in this region. (Author)

AD-431 669 Div. 2
OTS price $3.60

Chicago U., Ill.
SPECTRA OF LAKE ERIE WATER LEVELS,
by George W. Platzman and Desiraju B. Rao.
Oct 63, 35p. Technical rept. no. 9
Grant WBG7

Unclassified report

Descriptors: (*Lake waves, Oscillations), Lakes, Mathematical analysis, Meters, Oscillations, Measurement, Noise, Liquid level gages, Underwater sound.

Variance and covariance spectra of Lake Erie hourly scaled water levels are analyzed with resolution 0.1 cycles per day (in some instances 0.05 cpd) in the frequency range 0 to 8 cpd for thirteen stations in the six-month summer period April through September 1958, and for some of these stations in the six-month winter period October 1958 through March 1959. The main contribution to variance spectra at most stations is the range 0 to 1 cpd. Inherent noise levels are between 10,000 and .001 sq. ft./cycles per day; scaling noise is at most about .0001 sq. ft./cycles per day. The most conspicuous features of summer variance spectra are strong and consistent peaks near 1.7 cpd (14.1 hr), 2.6 cpd (9.2 hr), 4.0 cpd (6.0 hr), and 5.8 cpd (4.1 hr), which correspond to the first four modes of longitudinal free oscillation of the Lake. A diurnal peak appears consistently in analysis with 0.1 cpd resolution; with 0.05 cpd resolution a distinct semi-diurnal peak emerges at 1.95 cpd (12.3 hr). Covariance spectra give phases consistent with the hypothesis that the fundamental mode of oscillation is an amphidromic Kelvin-type wave, in which there is counterclockwise rotation of the phase of high water. (Author)

AD-431 670 Div. 2
OTS price $8.10

Chicago U., Ill.
THE FREE OSCILLATIONS OF LAKE ERIE,
by George W. Platzman and Desiraju B. Rao.
Sep 63, 86p. Technical rept. no. 8
Grant WBG7

Unclassified report

Descriptors: (*Lakes, Oscillation), Lake waves, Diurnal variations, Periodic variations, Mathematical analysis, Tides.

The longitudinal free oscillations of Lake Erie are investigated theoretically by numerical integration of the channel equations, and observationally by analysis of water-level covariance spectra. Good agreement is obtained between computed and observed periods of the first four modes, as well as between computed and observed amplitude. Particular attention is given to influence of the earth's rotation and to the effect of friction. The general conclusions are that the earth's rotation transforms the lowest longitudinal mode into an amphidromic wave with countererclockwise rotation of cotidal lines, but does not significantly affect the period of any mode. (Author)

AD-431 702 Div. 2, 22
OTS price $3.60

National Marine Consultants, Anaheim, Calif.
WATER WAVES PRODUCED BY IMPULSIVE ENERGY SOURCES,
by Bernard G. Grunebaum and Richard E. Kent.
June 62, 40p. Rept. no. ONR62
Contract Nonr3678 00

Unclassified report

Descriptors: (*Underwater explosions, Water waves), (*Water waves, Underwater explosions), Boundary value problems, Hydrodynamic, Seismic waves, Mathematical analysis.

Consideration is given to the mechanics of wave generation. The specific case under consideration is an explosion at considerable depth. A theoretical development is made which provides for specification of initial and boundary conditions on early motion and displacements without the usual neglect of non linear terms. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-431 703 Div. 2
OTS price $4.60

Air Weather Service, Scott Air Force Base, Ill.
UPPER-STRATOSPHERE DENSITY AND TEMPERATURE VARIABILITY DETERMINED FROM METEOROLOGICAL ROCKET NETWORK RESULTS, 1960-1962,
by R. S. Quiroz, J. K. Lambert and J. A. Dutton.
Dec 63, 48p.
AWS TR175 Unclassified report

Descriptors: (*Atmospheric temperature, Stratosphere), (*Stratosphere, Density), Diurnal variations, Sounding rockets, Upper atmosphere, Wind, Statistical data, Statistical analysis, Periodic variations.

AD-431 737 Div. 2
OTS price $4.60

General Electric Co., Santa Barbara, Calif.
RADIANT EMISSION FROM HIGH TEMPERATURE EQUILIBRIUM AIR,
by Douglas H. Archer. 18 Oct 63, 39p. Rept. no. RM63TMP44
Contract DA49 146XZ038
DASA 1435 Unclassified report

Descriptors: (*Atmospheric temperature, High altitudes), Spectra (Infrared), Infrared spectroscopy, Thermal radiation, Nitrogen, Nitrogen compounds.

The spectral distribution of the energy radiated by equilibrium air in the temperature range from 3000 to 9000 K has been computed for density ratios of 10 to the minus 4 power, 10 to the minus 5 power, and 10 to the minus 6 power. The results are an extension of the work of Breene and Nardone to the lower density ratios, and cover the wave number range from 1250 to 56,000 per cm. (Author)

AD-431 763 Div. 2
OTS price $3.60

Naval Air Station, Norfolk, Va.
ATMOSPHERIC ELECTRICITY MEASUREMENTS AS A POSSIBLE AID IN FOG FORECASTING.
Dec 63, 33p.
Task 29
NWRF 29 1263 086 Unclassified report

Descriptors: (*Atmospheric electricity, Weather forecasting), (*Weather forecasting, Fog), Reliability, Measurement.

Contents: Principles of Atmospheric Electricity; Atmospheric Electricity Station; Discussion of Data Used in Testing the Rules; Investigation of Forecasting Rules; Further Investigation of Electrical and Meteorological Parameters; and Conclusions on the Usefulness of Atmospheric Electricity Measurements in Fog Forecasting.

AD-431 787 Div. 2, 8
OTS price $4.60

Aerospace Information Div., Washington, D. C.
RADIO ASTRONOMY ANTENNAS AND PROCESSING OF RADIO ASTRONOMY DATA. ANNOTATED BIBLIOGRAPHY OF SOVIET LITERATURE (PRELIMINARY).
Rept. for 1958-Feb 63.
4 Mar 64, 45p.
AID B64 11 Unclassified report

Descriptors: (*Radio astronomy, Bibliographies), Extraterrestrial radio waves, Radar echo areas, Solar radiation, Aurorae, Moon, Radio waves.

AD-431 799 Div. 2, 5
OTS price $11.00

Naval Research Lab., Washington, D. C.
THE LIGHTWEIGHT TRANSOSONDE SYSTEM.
Final rept.,
by J. W. Allen and G. Welch. 30 Jan 64, 143p.
NRL 5921 Unclassified report

Descriptors: (*Meteorological balloons, Instrumentation), (*Radiosondes, Meteorological balloons), Spheres, Plastics, Radio transmitters, High frequency, Meteorological batteries, Flight testing, Costs, Upper atmosphere, Telemetering transmitters, Radio equipment, Coding, Meteorological instruments.

A new lightweight transosonde airborne system was developed. The new system, which consists of a lightweight plastic balloon and two small (1 cu ft) instrument packages, has been tested in a series of 50 flights over the Atlantic. After initial problems of balloon configuration and equipment limitations were resolved, a high percentage of successful flights was achieved. The balloon is a pressurized sphere (12.5 ft diameter) made of 0.002-in.-thick Mylar plastic. It weighs approximately 20 lb and will withstand 50 to 60 millibars internal pressure. The instrumentation consists of: (1) a dual-frequency crystal-controlled 30-watt high-frequency transmitter, (2) a power supply consisting of a battery made up of silver zinc cells supplying the low dc voltage (7.5), and a dc-to-dc converter supplying the high voltage (300 v, 600 v), and (3) a Morse code encoder and appropriate meteorological sensors (ambient pressure, ambient temperature, and balloon internal pressure). The instrumentation is housed in two plastic (polyurethane) packages. Each package, including instrumentation, weighs about six pounds. (Author)

AD-431 845 Div. 2
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
SOME FREQUENTLY USED FORMS OF THE EARTH'S GRAVITY POTENTIAL,
by P. T. Guttman. 31 Jan 64, 13p. Rept. no. TDR269 4550 10 5
Contract AF04 695 269
SSD TDR63 337 Unclassified report

Descriptors: (*Gravity, Standardization), Documentation, Earth, Potential theory.

The nomenclature and forms of the earth's gravity potential are summarized in order to clarify and standardize the information for those who desire to keep abreast of the developments in this area of study. (Author)

AD-431 867 Div. 2, 20
OTS price $2.60

RAND Corp., Santa Monica, Calif.
ENERGY DEPOSITION IN THE ATMOSPHERE FROM HIGH ALTITUDE GAMMA RAY SOURCES,
by J. I. Marcum. Nov 63, 28p. Memo no. RM3594PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Gamma rays, Upper atmosphere), Gamma-ray spectra, Monte Carlo method, High altitude, Energy, Absorption, Attenuation, Nuclear explosions.

Results for the deposition of energy in the atmosphere from two high altitude sources of gamma rays are given. The solutions were obtained by use of the RAND Monte Carlo gamma ray transport code and are presented in such a way that they

can be easily compared to results previously obtained for infinite homogeneous media. It has been shown in two particular cases that the deposition of energy from high altitude sources of gamma rays over a large volume of space does not differ from the equivalent problem with a uniform atmosphere by more than a factor of two. (Author)

AD-431 931 Div. 2, 20
OTS price $18.00

Meteorology Research, Inc., Altadena, Calif.
DISSEMINATION AND EVALUATION OF A TRACER MATERIAL RELEASE. VOLUME II. DATA SUPPLEMENT.
Final rept.,
by T. B. Smith and F. Vukovich. 29 Nov 63, 285p.
Rept. no. MR163FP108
Contract DA42 007AMC15X
Unclassified report

Descriptors: (*Tracer studies, Meteorological parameters), (*Doage, Radioactivity), Data, Winds, Turbulence, Temperature, Atmospheric sounding, Velocity, Time, Sampling, Tests.

AD-431 942 Div. 2
OTS price $2.60

Washington U., Seattle.
HYDROGRAPHY AND PHYTOPLANKTON PRODUCTION,
by George C. Anderson and Karl Banse. Dec 63, 25p. Technical Report no. 95; Ref. M63 49
Contract Nonr47710, Proj. NR 083 012
Unclassified report

Descriptors: (*Plankton, Hydrographic surveying), (*Oceanographic data, Plankton), Plants (Botany), Nutrition, Ocean currents, Ecology, Algae, Climatology, Wind.

Contents: Introduction; Spring blooms in deep water; Stratified seas; Upwelling; Polar seas; Horizontal water movements.

AD-431 946 Div. 2, 9
OTS price $2.60

Air Weather Service, Scott Air Force Base, Ill.
CLEAR AIR TURBULENCE,
by Carroll G. Thompson. Apr 61, 19p.
Unclassified report

Descriptors: (*Atmospheric motion, Turbulence), Weather forecasting, Shear stresses, Air mass analysis.

Frequency of occurrence, distribution, and the dynamic parameters most often considered in connection with clear air turbulence are examined. The rate of growth of turbulence is computed with hypothetical values of vertical shear, horizontal shear, and growth of turbulent energy with gravity waves assumed as primary sources of turbulent energy. A forecast scheme, as proposed in a referenced publication, is included. (Author)

AD-431 990 Div. 2
OTS price $3.60

Marine Lab., U. of Miami Coral Gables, Fla.
AMBIENT NOISE STUDIES OFF BIMINI, BAHAMAS.
Technical rept.,
by Roger Dann and Morton Kronengold. May 63, 35p.
Rept. no. 63 582
Contract NObs84540
Unclassified report

Descriptors: (*Noise, Underwater sound), (*Underwater sound, Noise), Hydrophones, Instrumentation, Measurement, Diurnal variations, Wind.

Long periods of observations of ambient noise, wind speed and wind direction were made during 1962 in an area off Bimini in the Bahamas. Noise from two depths, 65 feet and 1200 feet, was analyzed employing techniques to reduce the effects of noise of nearby ships on the results. A proposed system is described which will sequentially record ambient noise along with several oceanographic parameters, automatically process this information, and record the data on punched cards in a format suitable for computer operation. (Author)

AD-432 007 Div. 2
OTS price $11.00

Air Force Cambridge Research Labs., Bedford, Mass.
THE STRUCTURE OF OCCLUSIONS AS DETERMINED FROM SERIAL ASCENTS AND VERTICALLY-DIRECTED RADAR,
by Carl W. Kreitzberg. Jan 64, 147p.
Proj. 8641
AFCRL 64 26 Unclassified report

Descriptors: (*Meteorology, Atmospheric motion), Cyclones, Structures, Meteorological parameters, Radiosondes, Meteorological radar, Storms, Rainfall, Clouds, Experimental data, Theory, Mathematical analysis, Air mass analysis.

The thermal, cloud, and precipitation structures of occluded frontal systems on both the meso- and synoptic-scales are examined. The data used include serial-ascent radiosonde observations of five systems and the time-height precipitation structure of these and many other frontal systems as obtained using vertically-directed, 1.87-cm radar. For the serial-ascent cases, mesoscale vertical motions were computed using a variation of the adiabatic method which requires only single-station radiosonde data. The reliability of each vertical velocity is also computed to indicate the proper weighting of the values in the analysis. The reliabilities justify placing confidence in the principal features of the mesoscale vertical motion fields. The 'static energy' function which is a quasi-conservative for adiabatic and pseudo-adiabatic processes, has been found to be very useful for interpreting structures and processes, including turbulent mixing, in cloudy regions of the troposphere. The mesoscale thermal structure of frontal zones is characterized by multiple, narrow hyperbaroclinic subzones within the broader baroclinic zones separating relatively barotropic air masses. A front based on synoptic data cannot accurately depict the details of the mesoscale structure, but it can approximately locate the principal subzones within the broader baroclinic zone. (Author)

AD-432 009 Div. 2
OTS price $6.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
APPLICABILITY OF DUAL-PATH SOUND PROPAGATION MEASUREMENTS TO TEMPERATURE DETERMINATION OVER A SIX-MILE PATH,
by Wendell D. Olsen and Henry J. Leinbach.
Feb 64, 61p.
Task 166 20901A037 06
AERDA 112 Unclassified report

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

Descriptors: (*Atmospheric temperature, Acoustics), (*Sound transmission, Atmospheric temperature), Measurement, Sound generators, Meteorological parameters, Wind, Guided missile ranges, Velocity.

An experiment was conducted to determine the characteristics of two-way sound propagation over a six-mile geodetic line and the applicability of the measurements obtained to acoustic determination of mean temperatures over a long path. This experiment was performed in three phases over desert terrain at White Sands Missile Range during the months of February, May, and July of 1963. The acoustic source generator employed in this experiment consisted of a salute cannon firing 10-gauge blank shotgun shells for phases 1 and 2 and a gas jet generator also firing 10-gauge shotgun shells for phase 3. Results of the experiment indicate the necessity of favorable meteorological conditions for successful measurement of the sound in both directions as is necessary for application to temperature determination; therefore, the method cannot be considered as a reliable day-to-day technique to employ for this purpose. (Author)

AD-432 023 Div. 2
OTS price $2.60

Army Electronics Research and Development Activity, White Sands Missile Range (N. Mex.).
SOME OBSERVED SHORT TERM AND DIURNAL VARIATIONS OF STRATOSPHERIC DENSITY ABOVE 30 KM,
by Otto W. Thiele. Feb 64, 23p.
ERDA 114 Unclassified report

Descriptors: (*Stratosphere, Density), (*Density, Stratosphere), Atmospheric temperature, Barometric pressure, Diurnal variations, Sounding rockets, Thermistors, Instrumentation, Upper atmosphere, Atmospheric sounding.

Some observed variations of atmospheric density between 30 and 65 km over a short time period, including night-day variations, are presented. Five density profiles, three in darkness and two in daylight, were obtained with meteorological sounding rockets over a 48-hour period. The temperature was measured directly with a 0.32 mm bead thermistor, and the atmospheric density was derived using the hypsometric formula. Recent correction techniques have reduced density errors to 2 per cent up to 55 km, approximately 2.5% from 55 to 60 km, and within 3% from 60 to 65 km. Over the altitude range examined, the most significant variations in density occur in the region of 45 to 60 km, which is not surprising since these 5 observations as well as many others show this portion of the stratosphere to be the most active in terms of large temperature changes. Density variations of up to 8% were observed at equivalent altitudes over as short a period as 1 hour and 45 minutes from darkness into daylight. In a 24-hour period, variations of as much as 16.5% were observed. (Author)

AD-432 045 Div. 2
OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
OBSERVATIONS OF IONOSPHERIC BEHAVIOR DURING THE SOLAR ECLIPS OF 20 JULY 1963 AT BEDFORD, MASSACHUSETTS,
by Richard J. Miner. Jan 64, 21p.
Proj. 4603
AFCRL 64 24 Unclassified report

Descriptors: (*Solar eclipses, Ionospheric disturbances), (*Ionospheric disturbances, Solar eclipses), Ionosphere, Photographic analysis.

Observations of the ionosphere during the 20 July 1963 solar eclipse at Bedford, Massachusetts are presented. A C-4 vertical incidence sounder was used. Critical frequencies and virtual heights of the ionosphere are plotted and compared with a 10-day average curve. Ionograms of the time of first contact, maximum eclipse and fourth contact are included. A series of optical photographs of the sun in eclipse, taken at ground level, are presented. (Author)

AD-432 046 Div. 2
OTS price $5.60

Air Force Cambridge Research Labs, Bedford, Mass.
ANALYSIS OF MAGNETOTELLURIC MICROPULSATIONS AT WIDELY SEPARATED STATIONS,
by Roy L. Komack. Jan 64, 59p.
Proj. 4600
AFCRL 64 10 Unclassified report

Descriptors: (*Electric fields, Earth), Terrestrial magnetism, Electromagnetic waves, Audiofrequency, Measurement, Wave transmission, Analysis.

An investigation of ultra low frequency electromagnetic signals known as magnetotelluric micropulsations was made. The electric field strength at the earth's surface was measured by means of electrodes placed in the ground. Analog paper chart records of these signals were made at Trinidad, B.W.I., Puerto Rico, and Austin, Texas. These records were later hand-digitized. The power spectra of the signals at each station were computed for a data sample three quarters of an hour long. Certain power spectral peaks in the frequency range from .01 cps to .25 cps were noted. Several previously undiscovered regularities in the spectra of this sample were found. Power spectral peaks occurred at .05, .125, .175, and .225 cps. Also computed were coherencies between signals at all stations. Coherencies above .8 were found between signals recorded at stations more than 2,000 miles apart. The regular features found in the power spectra were also noted in the coherencies. In addition, some spectral line splitting was not obvious in the power spectra appeared in the coherencies. From the evidence presented it is concluded that certain frequency bands of micropulsations are simultaneous over great distances, and probably originate in the outer atmosphere. (Author)

AD-432 054 Div. 2, 1
OTS prce $21.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METEOROLOGY AND THE PILOT (Letchiku o Meteorologii),
by I. V. Kravchenko. 5 Dec 63, 399p.
FTD TT63 620 Unclassified report

Trans. from Voyennoye Izdatel'stvo Ministerstva Oborony, pp. 1-313, 1962.

Descriptors: (*Meteorology, Instruction manuals), Pilots, Air mass analysis, Atmospheric temperature, Barometric pressure, Density, Humidity, Wind, Clouds, Atmospheric precipitation, Fog, Anticyclones, Cyclones, Weather forecasting, Atmospheric motion, Thunderstorms, Lightning, Ice, Ice formation indicators, Aerial reconnaissance, Aircraft, Airplanes.

Contents: Basic Meteorological Elements; Air Masses, Atmospheric Fronts, Cyclones and Anticyclones; Airflows and Atmospheric Turbulence; Thunderstorms and Squalls; Aircraft Icing.

AD-432 072 Div. 2
OTS price $3.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
MONTHLY WIND AND TEMPERATURE DISTRIBUTIONS IN THE FIRST 62 METERS OF THE ATMOSPHERE FOR WHITE SANDS MISSILE RANGE, NEW MEXICO,
by Frank V. Hansen and Van Dyke Neill. Feb 64, 38p.
ERDA 113 Unclassified report

Descriptors: (*Atmospheric temperature, Data), (*Wind, Data), Distribution, Launching sites, Air mass analysis, Meteorology.

Wind and temperature data based on observations taken over a two-year period at the United States Army Electronics Research and Development Activity Meteorological Tower are presented. The data have been analyzed and tabulated at eleven cumulative percentage frequency levels for nine tower observational levels to a height of 62 meters above the surface. (Author)

AD-432 074. Div. 2
OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
ANALYSIS AND INTERPRETATION OF DAYTIME RADIATION DATA FROM TIROS III, ORBIT 4,
by William Viezee and Paul A. Davis. Jan 64, 43p.
Rept. no. SR2
Contract AF19 628 2777, Projs. 6698, 4448, Task 669803
AFCRL 64 34 Unclassified report

Descriptors: (*Radiation measurement systems, Meteorological satellites), (*Cloud cover, Albedo), Clouds, Photographic analysis, Solar radiation.

Radiation patterns analyzed from the listed data of Channels 2, 3, and 5 of TIROS III, Orbit 4, 12 July 1961, over the United States are compared with the cloud patterns shown on nearly concurrent cloud photographs. It is found that both the data from Channel 3 and Channel 5 can outline accurately all photographed cloud features of a dimension larger than 1- x 1-degree latitude. Patterns of Channel 5 albedo are related to a nephanalysis from surface observations of cloudiness and precipitation. Areas with only extensive cirriform cloudiness are characterized by low albedos. The highest albedos coincide with areas of precipitating clouds. A qualitative interpretation in terms of cloud type from a combination of Channel 2 effective temperatures and either Channel 3 or Channel 5 albedos is suggested. (Author)

AD-432 075 Div. 2, 8, 30
OTS price $9.10

Bendix, Southfield, Mich.
AUTOMATED ANALYTICAL STEROPLOTTER DESIGN DATA AND ANALYSIS.
Rept., 1 July-31 Oct 63,
by W. E. Chapelle. Jan 64, 109p.
Contract AF30 602 2942, Proj. 5569, Task 556901
RADC TDR63 539 Unclassified report

Descriptors: (*Stereoscopic map plotters, Electronic equipment), Design, Map projection, Automatic, Correlation techniques, Programming (Computers), Optical equipment, Optical scanning, Real time, Computers.

A system design was prepared and analysis performed for an automated version of the AS-11A analytical stereoplotter. The automated system uses electronic image correlation equipment in conjunction with the AS-11A control computer to automatically produce contour and profile charts. Full AS-11A system capability for accommodating frame or panoramic photography, either vertical or convergent, is retained. The system is designed to contour and profile at rates up to 10 millimeters per second with a 45-degree terrain-slope condition, considerably faster than the practical limit of 1 to 2 millimeters per second for the manually operated standard system. Variable conditions of contrast and information content as encountered in typical aerial photography can be accomodated. Capability is provided for semi-automatic orientation of the stereo model, for operation as a standard AS-11A system, and for visual monitoring during automatic operation. (Author)

AD-432 118 Div. 2, 20
OTS price $3.60

Isotopes Inc., Westwood, N. J.
PROJECT STAR DUST.
Quarterly rept. no. 6,
by James P. Friend, Herbert W. Feely and Micah W. M. Leo. 1 Nov 62, 32p.
Contract DA49 146XZ079
DASA 1306 Unclassified report

Descriptors: (*Radioactive fallout, Atmospheric motion), (*Atmospheric motion, Mathematical models), Air mass analysis, Strontium, Manganeses, Distribution, Stratosphere, Lethal dosage, Carbon, Isotopes, Neutrons, Nuclear explosion damage, Radioactivity.

Recent Progress in Project Star Dust is briefly described, including modification of the model of atmospheric mixing and circulation. The distributions of strontium-90 and of manganese-54 in the Star Dust sampling corridor during the first third of 1962 and the distribution of strontium-90 during the second third of 1962 are portrayed. The stratospheric burden of strontium-90 is calculated to be 1.8 to 2.0 megacuries during the first third of 1962, with 1.1 to 1.3 megacuries attributable to the 1961 Soviet tests. The stratospheric burden of manganese-54 during the first third of 1962 is calculated to be about 11 megacuries (or about 15 megacuries if the data are corrected for decay to 15 October 1961). Calculated stratospheric burdens of iron-55 and antimony-124 are approximately 22 megacuries and 10 megacuries respectively (or 24 megacuries and 51 megacuries respectively if corrected to 15 October 1961). The stratospheric burden of strontium-90 during the second third of 1962 is calculated to be less than 3.7 megacuries. Carbon-14 concentrations in ground level air at Washington Township, New Jersey during 1960-1962 are given. The tendency of these concentrations to decrease during the last months of 1960 and 1961 and the gradual increase in the concentrations during 1962 are discussed. (Author)

AD-432 132 Div. 2
OTS price $4.60

Air Force Missile Test Center, Patrick Air Force Base, Fla.
AMR METEOROLOGICAL HANDBOOK.
5 June 63, 45p.
AFMTC P105 1 Unclassified report

Descriptors: (*Meteorology, Handbooks), Tracking, Meteorological parameters, Wind, Temperature, Climatology, Tables, Guided missile ranges.

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-432 157 Div. 2, 25
OTS price $5.60

General Electric Co., Schenectady, N. Y.
APPLICATION OF ELECTRO OPTICS TO AURORAL STUDIES.
Final rept.,
by J. F. Spalding and J. E. Anderson. Dec 63, 57p.
Contract AF19 628 2366, Proj. 8653
AFCRL 64 209 Unclassified report

Descriptors: (*Aurorae, Emissivity), (*Image tubes, Electron optics), Radio astronomy, Night sky, Photons, Line spectrum, Spectra (Visible & ultraviolet), Brightness, Telescopes, Spectroscopy.

During 1963 an investigation was performed to examine the feasibility of obtaining information on the changing characteristics of the aurora and night air glow by low-light-level image orthicons (I.O.) at the Radio-Optical Observatory of the General Electric Company's Advanced Technology Laboratories in Schenectady, New York. Although it was a poor year for auroras, movies and spectral lines were simultaneously photographed of various displays from the I.O. monitor, and were compared with photographs taken by other people. The image orthicon is faster by about three orders of magnitude than photographic film. Night air glow spectra were adequately received with 8 second exposures, with 100 photons sufficient to record a line, even considering grating loss, etc. A detailed discussion on image orthicon utilization with weakly illuminated point, line and extended sources is given, along with the theoretical and practical limitations on dynamic range, intensity, calibrations, spectrograph wavelength calibration, and signal-to-noise ratio. (Author)

AD-432 243 Div. 2, 15, 30
OTS price $2.60

IBM Federal Systems Div., Rockville, Md.
OPTIMIZED DIGITAL AUTOMATIC MAP COMPILATION SYSTEM.
Interim rept. no. 3, 1 Aug-1 Nov 63.
30 Nov 63, 24p.
Contract DA44 009AMC111X, Proj. 8 T35 14 001 07
Unclassified report

Descriptors: (*Mapping, Programming (Computers)), (*Geodesics, Computer logic), Automatic, Computers, Stereoscopic photography, Compilers.

The Third Interim Technical Report describes the work completed on the development of ''A Digital Automatic Map Compilation System'' during the period of August 1, 1963 - November 1, 1963. The primary objectives of the project are: 1. To upgrade equipment and computer programs developed under contract DA 44-009 ENG 4724. 2. To develop and evaluate alternate methods of correlating conjugate image data scanned from aerial stereo diapositives. The equipment subsystem has the capability to scan, digitize and store information from a stereo pair, as well as reproduce photographic images from a set of previously stored data. The computer programs are written for use on the IBM 7090 and perform the general functions of resection-orientation, rectification, correlation, elevation computation, and generation of ortho-photo and contour output tapes. (Author)

AD-432 256 Div. 2, 32
OTS price $2.60

RAND Corp., Santa Monica, Calif.
THE RAND STUDY OF WATER SUPPLY,
by J. C. DeHaven. 3 Nov 60, 22p. Rept. no. P2136RC
Unclassified report

Descriptors: (*Water supplies, Economics), Sea water, Regeneration, Agriculture, Control, Commerce, Wastes (Sanitary engineering), Procurement, Industries, History, Design.

AD-432 264 Div. 2
OTS price $4.60

Naval Underwater Ordnance Station, Newport, R. I.
A MODIFIED FOUR-POINT LAGRANGIAN INTERPOLATION METHOD FOR OCEANOGRAPHIC STATION DATA,
by J. Farrell. Feb 64, 50p.
NUOS TM312 Unclassified report

Descriptors: (*Oceanographic data, Numerical analysis), Data, Analysis, Programming (Computers).

In conjunction with design and development responsibility for an in-water tracking system for AUTEC (Atlantic Undersea Test and Evaluation Center), the Naval Underwater Ordnance Station is analyzing the properties of sea water found in the Tongue of the Ocean. As part of this analysis, Station mathematicians have developed an automatic interpolation method specifically for oceanographic data. This method in incorporated in a computer program (IBM 1620) which interpolates the values of depth, temperature and salinity at isentropic levels -- designated constant values of the density functions. Basically, the method uses a four-point Lagrangian polynomial. However, built-in tests edit the data prior to computations, and modifications are made where oceanographic conditions distort the polynomial. This method has been evaluated and its accuracy demonstrated. It is recommended for general use in analyzing oceanographic data. (Author)

AD-432 274 Div. 2
OTS price $2.60

Sacramento Peak Observatory, Sunspot, N. Mex.
ON THE RADIO AND X-RAY EMISSION OF SOLAR FLARES,
by A. K. Pankratov, trans. by Alice B. Dunn.
1963, 25p.
SPO Solar RN50 Unclassified report

Descriptors: (*Solar flares, X-rays), (*Radio waves, Solar flares), Solar disturbances, Statistical analysis, Absorption, Ionospheric disturbances, Cosmic ray bursts.

The connection between X-ray emission and the emission in Ha of flares is studied statistically. Six intense chromospheric flares (importance 3 and 3+) which were not accompanied by X-ray emission were detected and also eight doubled flares which generated X-ray emission only in one knot or maximum. The absence of a directivity effect in the X-ray emission of flares is established. It is found that all type IV bursts of radio emission are accompanied by an appreciable flow of X-ray emission, sufficient for the appearance of a well noticeable (according to f/min) additional ionization of the D layer. The possibility of a unique relation between the presence of X-ray emission of solar flares and type IV bursts of radio emission is discussed briefly. It is proved that several intense ionospheric effects (in the D layer) are due to the X-ray emission from behind-the-limb flares, which are seen from the earth as subflares or not at all. An identical result was obtained in (11) and (12). This fact is apparently evidence that the region of generation of X-ray

emission is not limited by the region of flare emission in Ha but extends to heights of several tens of thousands of kilometers into the region of coronal condensations. (Author)

AD-432 403 Div. 2
OTS price $9.60

Texas Instruments Inc., Dallas.
RADAR ANALYSIS OF THE MOON. PHASE II: SURFACE PROPERTIES.
Final rept.,
by James D. Shaw and Carl A. Barlow, Jr.
16 Jan 64. 115p.
Contract AF19 628 2478, Proj. 7698, Task 769803
AFCRL 64 74 Unclassified report

Descriptors: (*Moon, Surfaces), (*Radar reflections, Moon), Surface properties, Electromagnetic properties, Density, Grain structure (Metallurgy), Mathematical analysis, Diffusion, Antennas, Terrain, Dielectric properties.

Utilization of radar in determining specific properties of the lunar surface is dependent upon (a) successful separation of the surface geometry and electromagnetic components of radar return from the lunar surface and (b) interpretation of the obtained electromagnetic property values in terms of other properties such as density, grain size, mineral content, and chemical composition. Careful evaluation of the relevant diffraction theory for describing radar return from an arbitrary terrain clearly shows (a) the inherent ambiguity between geometrical and electromagnetic contributions and (b) the deficiencies of the frequently used Huygens-Kirchoff theorem. A method for factorizing the geometrical and electromagnetic contributions is demonstrated - under the proviso that a separation between surface texture and gross terrain configuration is permissible. In the developed method, fundamental problems are included within, and restricted to, the conventional ''antenna function'' - a function amenable to measuring using models. A study was made to determine the extent to which the electromagnetic properties of terrestrial materials (having possible lunar surface counterparts) are influenced by physical state (e.g., crystalline structure, density, grain size and shape), mineral and chemical composition and testing conditions (e.g., temperature, pressure and radar frequency). (Author)

AD-432 405 Div. 2
OTS price $6.60

Texas A and M Coll., College Station.
RESEARCH ON TROPICAL RAINFALL PATTERNS AND ASSOCIATED MESO-SCALE SYSTEMS.
Quarterly progress rept. no. 4, 1 Aug-31 Dec 63,
by Walter K. Henry and John F. Griffiths.
15 Jan 64, 67p. Rept. no. 64 8T
Contract DA IA011001B021 09, Proj. 311
Unclassified report

Descriptors: (*Rainfall, Tropical regions), Statistical analysis, Tropical regions, Atmospheric precipitation, Meteorological parameters, Periodic variations, Diurnal variations, Weather forecasting, Weather stations.

A study of the areal variations of rainfall in the Panama-Costa Rica area shows the extreme variation of rainfall. Also the daily variations from station to station and from day to day are discussed. Using data from two Central America stations with long periods of records various methods have been attempted whereby the start, finish, and duration of the rainy season may be calculated. One of these, using a simple water balance technique, gives sensible and consistent results and the analysis for the two stations are presented. (Author)

AD-432 422 Div. 2
OTS price $6.60

Air Weather Service, Scott Air Force Base, Ill.
TERMINAL FORECAST REFERENCE FILE. LAJES FIELD AZORES.
Jan 64, 68p.
Unclassified report

Descriptors: (*Weather forecasting, Wind), Weather stations, Wind, Climatology, Meteorological parameters, Terrain.

AD-432 438 Div. 2
OTS price $1.60

Weather Bureau, Washington, D. C.
ON FORECASTING THE GEOPOTENTIAL IN A POLYTROPIC ATMOSPHERE (K Prognozu Geopotentsiala V Politropnoi Atmosfere),
by S. I. Gubanova, G. M. Khalikova and N. G. Turianskaia, tr. by Irene A. Donehoo. Jun 63, 17p.
WB DC T97 Unclassified report

Trans. from Tsentrial'nyi Institut Prognozov: Trudy, vyp. 102, pp. 53-59, 1962.

Descriptors: (*Gravity, Differential equations), (*Potential theory, Earth models), Barometric pressure, Atmosphere models, Atmospheric temperature, Friction, Bound layer, Nonlinear differential equations, Boundary value problems, Energy.

A nonlinear spatial problem on forecasting the geopotential over the Northern Hemisphere is solved. It is assumed that the temperature varies linearly with height in the troposphere and does not depend on the vertical coordinates in the stratosphere. The effect of ground friction is studied by determining the vertical components of speed at the limit of the boundary layer according to method. The problem is reduced to a system of two differential equations, which are solved by successive approximations. The solution is derived for an orthogonal rectilinear network, located on the Northern Hemisphere map in a stereographic projection. (Author)

AD-432 440 Div. 2
OTS price $1.60

Weather Bureau, Washington, D. C.
OPERATIONAL EXPERIMENTAL METHOD OF OBJECTIVE ANALYSIS OF THE GEOPOTENTIAL FIELD (Operativnoe Ispytanie Skhemy Ob'Ektivnogo Analiza Polei Geopotentsiala),
by I. A. Chetverikov, tr. by Harold K. Gold.
Jul 63, 14p.
WB DC T 98 Unclassified report

Trans. from Ob'ektivnyi Analiz i Prognoz Meteorologicheskikh Elementov. (A Symposium). Akad. Nauk USSR, pp. 14-20, 1963.

Descriptors: (*Potential theory, Earth models), Energy, Mapping, Analysis.

AD-432 441 Div. 2
OTS price $2.60

Weather Bureau, Washington, D. C.
RESULTS OF AN EXPERIMENT IN THE NUMERICAL FORE-

CASTING OF 850, 500 AND 200 MB CONTOUR CHARTS (Rezul'taty Ispytaniia Chislennogo Metoda Prognoza Kart at 850, at 500 I at 200),
by P. N. Belov, tr. by Irene A. Donehoo. Jul 63, 21p.
WB DC T 99 Unclassified report

Trans. from Meteorologiia i Gidrologiia, No. 10, pp. 12-21, 1962.

Descriptors: (*Weather forecasting, Mapping), Thermodynamics, Atmospheric temperature, Mathematical analysis, Meteorological charts.

AD-432 468 Div. 2
OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
THE DISTRIBUTION OF CLEAR AIR TURBULENCE REPORTS AND CLOUD PATTERNS AS SEEN IN SATELLITE PHOTOGRAPHS.
Final rept.,
by Sidney M. Serebreny and Eldon J. Wiegman.
Jan 64, 51p.
Contract Cwb10481, Proj. SRI4279
Unclassified report

Descriptors: (*Atmospheric motion, Turbulence), Meteorological satellites, Photographic analysis, Clouds, Cloud cover, Barometric pressure, Air mass analysis, Vortices, Pattern recognition, Cyclones, Meteorological charts.

Selected COMBAR reports of clear air turbulence for ten days from April and May 1960 are studied in association with the cloud distribution shown by TIROS I during this period. Characteristic cloud patterns accompany certain types of weather systems, particularly low pressure vortices, and often delineate, rather well, the location of jet streams and tropopauses (which are known to be associated with clear air turbulence occurrences) about these weather systems. As a consequence, satellite photographs of low pressure vortices may provide a useful supplemental tool in establishing the areal distribution of clear air turbulence risk during various stages of cyclone development. Schematic representations of the typical cloud patterns during three stages of cyclone development are presented. Four case histories are included as characteristic examples. (Author)

AD-432 714 Div. 2
OTS price $5.60

Pennsylvania State U., University Park.
VARIABILITY OF WIND WITH COLD FRONTAL PASSAGE. (A STUDY OF THE WIND FIELD IN THE LOWER 15,000 FEET BY SERIAL BALLOON ASCENTS),
by Wilbert G. Maunz. Dec 63, 58p.
Unclassified report

Descriptors: (*Air mass analysis, Atmosphere models), Wind, Periodic variations, Atmospheric motion, Meteorological balloons, Meteorological radar, Meteorological charts, Shear stresses.

AD-432 778 Div. 2, 6
OTS price $12.50

Massachusetts Inst. of Tech., Cambridge.
CHARACTERISTICS OF NEW ENGLAND THUNDERSTORMS VIEWED ON 10 CM RADAR.
by Taylor Frank Stem, Jr. 20 Jan 64, 176p.
Unclassified report

Master's thesis.

Descriptors: (*Thunderstorms, Air mass analysis), Meteorological radar, Storms, Radar echo areas, Wind, Atmospheric motion, Radar reflections, Meteorological charts, Photographs, Plan position indicators.

Thunderstorms were observed with a 10 cm radar during the summer of 1963. The radar observations of seven thunderstorm situations which occurred in June were analysed and studied in conjunction with the routinely observed and analysed synoptic data. Each thunderstorm case was described separately and the most general characteristics were presented and discussed. The following features were noted: 1) The storms in all seven cases formed in well defined areas, which were determined by frontal convergence, seabreeze convergence, or local topography. 2) The echoes were composed of a number of sub-cells, which grew and decayed in a cycle similar to that described by Byers and Braham (1949). The larger echoes, termed storm complexes, had life periods of the order of several hours and seemed to pulsate as the sub-cells grew and decayed. It is implied that the sub-cells are compoded of even smaller cells or currents that have much shorter life periods. 3) The storms of this study reached their maximum intensity during the mid-afternoon while the surface heating was at a maximum. 4) In all the cases where storms moved eastward to the coast, they lost intensity and dissipated as the coastal region was reached. 5) The storm motion was determined by the mean wind flow through the level through which the storm extended. The SCR 615-B (10.7 cm) radar is considered an effective tool for studying the structure of thunderstorms; however, its poor resolution averages out a large amount of detail. (Author)

AD-432 809 Div. 2, 32
OTS price $17.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
BIBLIOGRAPHY ON SNOW, ICE AND PERMAFROST WITH ABSTRACTS. VOLUME XVII.
June 63, 274p.
CRREL 12 Unclassified report

Descriptors: (*Bibliographies, Permafrost), (*Permafrost, Bibliographies), (*Snow, Bibliographies), (*Ice, Bibliographies), (*Abstracts, Permafrost), Polar regions, Ablation, Avalanches, Crystallization, Cold weather tests, Mechanics, Frost bite, Construction, Heat.

The Bibliography on Snow, Ice and Permaforst with Abstracts (CRREL Report 12) was initiated in 1952 and is a continuing project of the Science and Technology Division, Cold Regions Project Section of the Library of Congress, prepared for the U. S. Army Cold Regions Research and Engineering Laboratory (USA CRREL) of the Corps of Engineers. Volumes 1-15 were issued as SIPRE Report 12. Volume 16 was the first issued under the new title CRREL Report 12. The present Volume 17 includes abstracts SIP 20001-21000. Primarily, the bibliography provides USA CRREL with current and comprehensive coverage on scientific imformation, both basic and applied, about living and operating in the polar and subpolar regions. The subjects covered vary from ablation to whiteout and include such diverse topics as avalanche forecasting, ice crystallography, snow mechanics, frost effects, tunneling and excavations, development of trafficable surfaces, permafrost construction, and various phases of heat and mass budgets. (Author)

AD-432 827 Div. 2, 25
OTS price $1.60

Thayer School of Engineering, Dartmouth Coll., Hanover, N. H.
STUDIES OF WHISTLERS AND AUDIO-FREQUENCY EMISSIONS.
Final rept., 1 Oct 58-30 Sep 61,
by Millett G. Morgan. 19 Aug 63, 19p.
Contract AF19 604 3055, Proj. 8653, Task 865302
AFCRL 63 772 Unclassified report

Descriptors: (*Whistlers, Reviews), Atmospheric electricity, Atmospherics, Meteorological phenomena, Lightning, Audio frequency.

Contents: ATMOSPHERIC WHISTLERS, by R. A. Helliwell and M. G. Morgan. 15 Dec 58 (Reprint from the Proceedings of the IRE 47:2, pp. 200-208, Feb 59); PATH COMBINATIONS IN WHISTLER ECHOES, by M. G. Morgan, H. W. Curtis and W. C. Johnson. 6 Jan 59 (Reprint from the Proceeding of the IRE 47:2, pp. 328-329, Feb 59).

AD-432 848 Div. 2
OTS price $5.60

Space Sciences Lab., U. of Calif., Berkeley.
PI 2'S - A REVIEW,
by Ruben Zelwer. 11 Feb 64, 51p. Rept. no. Series no. 5, Issue no. 7
Contract Nonr22289
Unclassified report

Descriptors: (*Aurorae, Terrestrial magnetism), (*Magnetic fields, Aurorae), Periodic variations, Ionospheric disturbances, Magnetic storms, Reviews.

AD-432 849 Div. 2, 12
OTS price $14.50

Aracon Geophysics Co., Div. of Allied Research Associates, Inc., Concord, Mass.
SYNOPTIC INTERPRETATIONS OF CLOUD VORTEX PATTERNS AS OBSERVED BY METEOROLOGICAL SATELLITES.
Final rept.,
by Roland J. Boucher, Clinton J. Bowley, Earl S. Merritt, C.W.C. Rogers and Paul E. Sherr.
Nov 63, 211p. Rept. no. F8243 2
Contract Cwb10630
Unclassified report

Descriptors: (*Clouds, Photographic analysis), (*Meteorological satellites, Clouds), Cloud cover, Vortices, Weather forecasting, Barometric pressure, Air mass analysis, Statistical analysis, Troposphere, Wind, Storms.

This report discusses investigations whose objectives were: (1) the determination of interpretation keys to permit more precise synoptic deductions from the varieties of vortex patterns visible in TIROS pictures, and (2) consideration of what data and interpretations pertinent to such vortex patterns should be incorporated in the depictions provided by the nephanalyses. Correlations between the cloud features in vortex patterns and conventional synoptic parameters were examined. These studies were limited both by the lack of sufficient quantities of TIROS data considered representative of the earlier stages of vortex development, and by the inadequacies of conventional weather analyses over many ocean areas. For vortices normally representative of the more advanced stages of development, the one standard deviation circle, for the distance between the position of the cloud vortex center and that of the related surface pressure center, had a radius of 148 nautical miles. At 500 mb, the corresponding value was 109 nautical miles. In both cases, it appears a considerable part of this position difference may often be ascribable to uncertainty as to the true position of the pressure center. (Author)

AD-432 872 Div. 2, 25
OTS price $3.60

Ionosphere Research Lab., Pennsylvania State U. University Park.
A METHOD FOR OBTAINING INSTANTANEOUS VALUES OF RECOMBINATION COEFFICIENT,
by A. P. Mitra. 1 Feb 64, 34p. Rept. no. SR204
Contract AF19 628 3842, Proj. 8605, Task 860502
AFCRL 64 31 Unclassified report

Descriptors: (*Recombination reactions, Ionization), (*Diurnal variations, Ionosphere), Electron density, Time, Equations.

Currently available methods for the experimental determination of the effective recombination coefficient from the diurnal variations of ionospheric ionization, height or absorption, give reliable values only where the coefficient has no diurnal variation. Where such a variation exists, the coefficients determined by these methods are spuriously altered, sometimes to zero or even negative values, and the diurnal variation is substantially exaggerated. A method is introduced for obtaining the instantaneous values (as against 'comparison' values given by current methods) at layer maxima, applicable principally for the E and the F1 regions. It is shown that an application of this method to the E region critical frequency data of a number of medium and low latitudes stations gives remarkable small diurnal variations of the coefficient at E region heights in contrast with the large diurnal variation obtained by the 'comparison' methods. Another surprising feature of the results is that the diurnal variations for both high and low latitudes are in the same sense, and there is no definite evidence of a phase reversal - again contradicting results obtained by comparison methods. (Author)

AD-432 889 Div. 2, 30
OTS price $3.60

Travelers Research Center, Inc., Hartford, Conn.
(No title).
Monthly progress rept. for Feb 64,
by Carl F. Jenkins. Feb 64, 34p.
Contract Cwb10704, Proj. 7411
Unclassified report

Descriptors: (*Weather forecasting, Mathematical prediction), Statistical analysis, Visibility, Weather stations, Data processing systems, Algebra, Programming (Computers), Ceiling.

AD-433 107 Div. 2
OTS price $2.60

Geophysics Lab. Mass. Inst. of Tech., Cambridge.
STREAMING POTENTIAL MEASUREMENTS,
by E. green. 8 Feb 63, 27p. Rept. no. 9017 2
MIT Proj. DSR 9017
Unclassified report

Subcontract to Allied Research Associates Inc., Contract AF49 638 1101.

Descriptors: (*Rock (Geology), Fluid flow), (*Electric potential, Measurement), Electrical conductance, Porosity, Permeability, Electro-

static fields, Recording systems, Igneous rock, Basalt, Sandstone, Experimental data, Tables.

One of the electrical after-effects of undergound explosions may be a voltage signal produced by the flow of interstitial rock fluids under the resulting pressure gradient. This voltage--called the streaming potential--arises as the result of charge separation in the fluid as it flows through a porous, surface-active medium. The potentials developed by fifty samples of a wide variety of rocks have been measured. In rocks of moderately high permeability the fluid squeezed through may come from some distance away and hence may be of very different character than the interstitial fluid originally present in the rock. Therefore, part of this study has been in an attempt to understand the consequences of such pore fluid variations. In addition, some correlations have been attempted, relating the streaming potential to the rocks' geometrical properties. (Author)

AD-433 130 Div. 2
OTS price $4.60

Massachusetts Inst. of Tech., Cambridge.
HEMISPHERIC WATER BALANCE FOR THE IGY,
by Victor P. Starr, Jose P. Peixoto and Alfred R. Crisi. 1 Dec 63, 41p. Rept. no. SR4
Contract AF19 628 2408, Proj. 8628, Task 862802
AFCRL 63 928 Unclassified report

Descriptors: (*Water, Evaporation), (*Atmospheric precipitation, Water vapor), Atmosphere, Rainfall, Humidity, Evapotranspiration.

A study of various fields relating to water vapor and its flow over The northern hemisphere during the IGY covering the mean conditions for the calendar year 1958 is presented. The study includes analyses of the amount of precipitable water, of the vertically integrated water vapor transport and of the divergence of water vapor transport for the hemisphere. Some implications of the water vapor divergence field are deduced which are important for hydrology and oceanography. The water vapor balance is discussed in the light of various meteorological considerations. (Author)

AD-433 188 Div. 2, 25
OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
OPERATOR VARIANCE IN THE DETERMINATION OF THE PLASTIC LIMIT,
by G. E. Ballard and W. F. Weeks. Sep 63, 14p.
CRREL RR177 Unclassified report

Descriptors: (*Soils, Mechanical properties), (*Soil mechanics, Plasticity), Analysis of variance, Sampling, Mathematical models, Statistical analysis, Particle size.

An experiment designed to investigate operator variance in determining the plastic limit of cohesive soils, independent of sample preparation and hydration time, is reported. A standard sample of Grundite and pure silt was prepared, the sample was hydrated for 3 weeks, 5 random samples were taken, and 5 replicates performed on each sample. Analysis of variance showed that the sample was homogeneous at the 0.05 level of significance. Random samples were distributed to 5 zones (groups) of operators, each with different backgrounds and engineering interests. Two operators from each group performed 5 replicates. The analysis-of-variance model used in the analysis was mixed, and the upper level fixed and the 2 lower levels random. The estimated within and between operator variances were 0.45 and 4.18, respectively. (Author)

AD-433 210 Div. 2, 8
OTS price $2.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
CONVERSION OF TOPSIDE IONOGRAMS TO EXPONENTIAL ELECTRON-DENSITY PROFILES,
by P. R. Arendt and A. Papayoanou. Feb 64, 21p.
Task 1A010501B010 00 38
AELRDL TR2424 Unclassified report

Descriptors: (*Electron density, Distribution), (*Ionosphere, Electron density), Scientific satellites, Special functions (Mathematics), Ionospheric propagation.

Ionograms obtained from the Alouette satellite suggest that above the F2 layer the electron-density profile is an exponential or quasi-exponential function. This concept of electron distribution is used in reducing the ionograms to true-height profiles. The reduction yields the distribution as well as the altitude variation of the exponential function. (Author)

AD-433 239 Div. 2, 25
OTS price $1.60

RAND Corp., Santa Monica, Calif.
ELECTROSTATIC FORCES AND CLOUD-DROPLET INTERACTION,
by M. H. Davis. Mar 64, 11p. Rept. no. P2885
Unclassified report

Descriptors: (*Clouds, Drops), (*Electrostatics, Hydrodynamics), Numerical analysis, Electrostatic fields, Measurement, Trajectories, Integration, Polarization.

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

No Entries

4. CHEMISTRY

AD-431 220 Div. 4
OTS price $.50

Oregon State U., Corvallis.
VAPOR PHASE HYDROLYSIS OF PENTABORANE-9.
Rept. for 1 June 62-31 May 63,
by G. W. Bulter, T. D. Parsons, C. H. Wang and D. J. Reed. Dec 63, 14p.
Contract DA18 108cml7154, Proj. 6302, Task 630202
AMRL TDR63 129 Unclassified report

Report on Project TORES.

Descriptors: (*Pentaboranes, Hydrolysis), Chemistry, Chemical reactions, Boron, Boron compounds, Borohydrides, Chemical properties, Chemical bonds.

The hydrolysis of pentaborane-9 in the vapor phase was carried out at 85 C and 150 C. The reactions carried out at 150 C were at initial pentaborane concentrations in a ratio of 10 to 1 with a constant water concentration. Since these reaction conditions gave initial rate constants in a ratio of 10 to 1, it was concluded that the vapor phase hydrolysis of pentaborane was initially first order in respect to pentaborane concentration. A proposed mechanim for the reaction suggests an initial hydrolysis of the terminal hydrogen atoms of pentaborane at a decreasing rate followed by the rupture of the pyramidal boron framework and/or hydrolysis of the bridge hydrogen atoms at an accelerated rate. (Author)

AD-431 240 Div. 4
OTS price $1.10

Redstone Scientific Information Center, Redstone Arsenal, Ala.
SYNTHESIS OF POLYORGANOALUMINOSILOXANES REACTION OF DOUBLE DECOMPOSITION OF SODIUM SALTS, ALKYLSILANETRIOLS AND ALUMINUM CHLORIDE,
by K. A. Andrianov and A. A. Zhdanov. 14 Feb 64, 10p.
RSIC 134 Unclassified report

Trans. from Doklady Akademii Nauk SSSR, 114, ppp. 1005-1007, 1957.

Descriptors: (*Metalorganic compounds, Polymers), (*Siloxanes, Aluminum compounds), Aromatic compounds, Silanes, Hydroxides, Sodium compounds, Salts, Alkanes, Chlorides.

The purpose of this investigation is to study the interaction of sodium salts of alkylsilanetriols with aluminum chloride. It is known that sodium salts of the alkylsilanetriols are similar in their properties to salts of weak organic acids. It is to be expected that a double decomposition reaction will occur during interaction of these salts with aluminum chloride. The formation of polyorganoaluminosiloxanes will largly depend on the manner in which the process is performed. If a considerable volume of water is present in the reaction medium, the process should be directed toward the formation of aluminum hydroxide. The arid medium should help the process to proceed in the direction of siloxane formation. (Author)

AD-431 628 Div. 4
OTS price $9.10

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
(No title).
Technical rept. no. 10, 1 Mar-31 Aug 63.
31 Aug 63, 107p.
Contract Nonr269300, Task NR356 407
Unclassified report

Descriptors: (*Polymers, Molecular structure), (*Inorganic polymers, Physical properties), (*Styrene plastics, Molecular structure), Molecular weight, Viscosity, Transition temperature, Mechanical properties, Viscoelasticity, Torsion meters, Acrylic resins, Polyethylene plastics, Vinyl plastics, Polymerization, Synthesis (Chemistry), Crystals, Complex compounds, Physical properties, Spectra (Infrared), Zinc compounds, Chromium compounds, Phosphorus compounds.

Contents: Molecular Structure and Melt Viscosity of Polymers -- A General Relation Between the Zero Shear Viscosity and Molecular Parameters for Polymeric Materials; Synthesis of Low Molecular Weight Polystyrene -- Difunctional Anionic Polymerization Initiators from the Reaction of Butyllithium with Trans-Stilbene, Synthesis of Polystyrene with M< 10,000 by Anionic Techniques and Intrinsic Viscosity-Molecular Weight Relations over a Broad Range in Molecular Weight; Star and Comb Type Branched Polystyrene -- Precursors for Star and Comb Type Branched Polystyrene, Star Type Polystyrene. Melt Viscosity of Star Type Polystyrene; The Forced Oscillation Torsion Pendulum; Chain Conformations and Internal Energies of Real Polymers; Physical Measurements on Novel Inorganic Polymers. (Author)

AD-431 687 Div. 4
OTS price $2.60

New York U. Coll. of Engineering, N. Y.
INVESTIGATION OF THE PREPARATION OF HIGH PURITY METALS VIA THE DECOMPOSITION OF CYCLOPENTADIENYL AND ARENE PI-COMPLEX COMPOUNDS.
Scientific rept. no. 2, 1 Nov 62 - 31 Oct 63,
by Minoru Tsutsui and Charles J. Marsel.
31 Oct 63, 24p.
Contract AF19 628 1685, Proj. 4608, Task 460802
AFCRL 63 537 Unclassified report

Descriptors: (*Metalorganic compounds, Pyrolysis), (*Chromium, Metalorganic compounds), (*Europium, Metalorganic compounds), (*Complex compounds, Metalorganic compounds), Iodides, Low-pressure research, Vacuum apparatus, Chromium compounds, Europium compounds, Synthesis (Chemistry), Benzene.

Preliminary work on the thermal decomposition of dibenzenechromium (o) has suggested that chromium metal can be obtained which is free of contamination from carbon. However, the formation of chromium films makes it difficult to remove from glass substrates. Some recent experiments on the deposition of chromium on tantalum sheet have been unsuccessful but are continuing. All experiments to prepare pure organoeuropium compounds have so far been unsuccessful. These included attempts to prepare the tri-cyclopentadienyl, methylcyclopentadienyl, phenyl, mesityl, methyl and pentafluorophenyl derivatives. While tricyclopentadienyl samarium can be prepared, attempts at the preparation of trimesityl and tripentafluorophenyl samarium were not successful. An impure sample of the latter compound was decomposed under vacuum to give a carbon containing residue. (Author)

Division 4 - CHEMISTRY

AD-431 720 Div. 4, 30
OTS price $.75

Research and Technology Division, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STORAGE AND RETRIEVAL OF WYANDOTTE-ASTM INFRARED SPECTRAL DATA USING AN IBM 7090 COMPUTER.
Rept. for Oct 61-Oct 63,
by Lee D. Smithson, Leonard B. Fall, Frederick D. Pitts and F. W. Bauer. Feb 64, 29p.
Proj. 7360, Task 736005
RTD TDR63 4265 Unclassified report

Report on Materials Analysis and Evaluation Techniques.

Descriptors: (*Information retrieval, Spectra (Infrared)), (*Spectra (Infrared), Information retrieval), (*Programming (Computers), Information retrieval).

The work described in this report was performed to determine the practicability of using existing infrared punched card data with a computer to improve storage and retrieval. Prior to this work, Wyandotte-ASTM Punched Cards were used with sorting machines for the purpose of matching infrared spectra in qualitative analysis and for correlating chemical structure and absorption band positions. The increasing amount of data (10,000 cards per year) made it desirable to find a faster soring system. The data from 51,734 Wyandotte-ASTM infrared punched cards were transferred to a magnetic tape and a computer program was written which allows for any logical sorting operation to be performed. The program was designed for as many as thirty-six separate ''problems'' or requests. The identification of organic and inorganic compounds by rapidly locating matching infrared spectra for direct comparison has been significantly improved with the development of this computer program. The significance of this program lies in the almost immediate identification of unknown compounds that are amenable to analysis by infrared spectroscopy provided that a spectrum of the compound is indexed by the Wyandotte-ASTM punched cards. (Author)

AD-431 734 Div. 4
OTS price $1.50

Research and Technology Div., Air Force Systems Command, Edwards, Calif.
EXPERIMENTAL TECHNIQUES FOR SOFT X-RAY SPECTROSCOPY.
Rept. for Sep 62-Oct 63,
by David W. Fischer and William L. Baun. Feb 64, 52p.
Proj. 7360, Task 736005
RTD TDR63 4232 Unclassified report

Report on The Chemistry and Physics of Materials.

Descriptors: (*X-ray spectroscopy, Instrumentation), Soaps, Detectors, Geiger counters, Esters, Solid state physics, Silicon, Photocathodes, Cesium compounds, Iodides, Scintillation counters, Mica, Diffraction, Line spectrum, Phthalates, Ammonium compounds, Potassium compounds, Ethylenedinitrilo tetra-acetates, Rubidium compounds, Stearates, Barium compounds, Fatty acids, Octanoic acids, Dibasic acids, Transition elements, Films, Phosphates.

Instrumentation for soft X-ray research is briefly described. Preliminary results are shown for several dispersing systems which have been found useful in the 10 to 100A region. Results from single crystals of group 1A salts of phthalic acid are discussed, and intensity measurements are reported. Other organic single crystals such as long chain derivatives of adipic acid are evaluated along with films of organic compounds prepared by the Blodgett-Langmuir technique. The efficiencies of the dispersing elements mentioned above are compared with commercial crystals such as mica, ADP, and EDDT. Performance of detectors for soft X rays is shown for flow proportional and Geiger counters, solid state silicon barrier detector, and a windowless resistance strip magnetic electron multiplier. The relative efficiencies of several photocathode materials for the latter detector are discussed. (Author)

AD-431 738 Div. 4, 2
OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
RAPID ANALYSIS OF MARINE SEDIMENTS FOR CALCIUM AND MAGNESIUM CARBONATES,
by Eddy S. Matsui. 10 Jan 64, 13p.
Task Y F015 01 01 001g
NCEL TN570 Unclassified report

Descriptors: (*Ocean bottom sampling, Carbonates), (*Carbonates, Volumetric analysis), (*Volumetric analysis, Carbonates), Magnesium compounds, Calcium compounds, Sedimentation, Chemical analysis, Dyes, Complex compounds, Potassium compounds, Cyanides, Chelate compounds, Inhibition, Ethylenedinitrilo tetra-acetates.

The compleximetric titration method using ethylene-diaminetetraacetic acid (EDTA) for quantitative determination of calcium and magnesium carbonates is often difficult to use on marine sediments because of high concentrations of the interfering metal ions usually present. Potassium cynaide was investigated as an inhibitor to suppress this interference. The accuracy of this method was determined by replicate analyses of standard solutions. It was concluded that an accurate determination of calcium and magnesium carbonates can be obtained by compleximetric titration using potassium cyanide as an inhibitor. (Author)

AD-431 797 Div. 4, 25
OTS price $1.60

Naval Research Lab., Washington, D. C.
SYNTHESIS OF NEW HIGH-TEMPERATURE MATERIALS WITH THE PLASMA JET.
Final rept.,
by J. M. Hall. July 63, 15p.
NRL MR1490 Unclassified report

Descriptors: (*Plasma jets, Synthesis (Chemistry)), (*High-temperature research, Synthesis (Chemistry)), (*Ceramic materials, Synthesis (Chemistry)), Refractory materials, Zirconium compounds, Titanium compounds, Tantalum compounds, Tungsten compounds, Molybdenum compounds, Magnesium compounds, Nitrides, Energy.

Chemical reactions in the plasma state offer promise for the synthesis of many new materials of interest to various high-temperature programs. A preliminary study was made to evaluate the plasma jet and the high-intensity carbon arc for this purpose, using injected powdered solids as reactants. The products sought included suboxides, intermetallics, metal-coated ceramic particles, and rare-earth nitrides, borides and carbides. In spite of its extremely high peak temperature the plasma jet was found to be unsuitable for the purpose due to injection difficulties, insufficient dwell time, small volume of hot zone, and steep temperature gradients. The high-intensity arc shows more promise as a high-temperature reactor. (Author)

AD-431 871 Div. 4, 10
OTS price $.75

Pennsalt Chemicals Corp., Philadelphia, Pa.
RESEARCH ON NEW OXIDANTS AND MECHANISMS OF OXIDANTS.
Semi-annual rept. no. 1, 1 Jun-1 Dec 63,
by D. M. Gardner. Dec 63, 27p.
Contract DA18 108AMC162A
Unclassified report

Descriptors: (*Fluorine compounds, Chlorine compounds), (*Chlorine compounds, Fluorine compounds), (*Oxidizers, Fluorine compounds), Piperidines, N-heterocyclic compounds, Organic sulfur compounds, Organic phosphorus compounds, Complex compounds, Esters, Sulfides, Amines, Sulfoxides, Phosphates, Phosphonic acids, Pyridines, Chemical reactions, Oxidation, Reaction kinetics, Molecular structure.

Reactions of C103F with a number of selected organic compounds were studied. The following compounds were not attacked by C103F: pyridine, tributyl phosphate, methyl benzilate, dimethyl methylphosphonate, and O,O,S - triethyl phosphorothiolate. Piperidine reacted to form the unstable, explosive N-perchloryl piperidine, the first known member of a new class of organic compounds. N-perchloryl piperidine slowly hydrolyzes in base to isotripiperideine-N-oxide. Dimethyl sulfide reacts violently with C103F but the reaction can be controlled by the use of solvents or of low gas flow rates of C103F. O,O-Diethyl phosphorodithiolate reacts with C103F to form at least two condensed species: an oil and crystals. Triethylene diamine reacts with C103F to form an unstable, hygroscopic complex of the type N(C2H4)3NC103(+)F(-). In contrast triethylamine undergoes an exothermic reaction with C103F. (Author)

AD-432 003 Div. 4, 25
OTS price $1.10

Oregon State U., Corvallis.
RADIATION-COLORING OF ALKALI HALIDE CRYSTALS CONTAINING SULFATE IONS,
by Allen B. Scott and B. J. Bosco. 1 Aug 63,
8p. Rept. no. TR5
Contract Nonr128605, Proj. NR018 701
Unclassified report

Report on a Magnetic Study of Color Centers in Alkali Halides.

Descriptors: (*Alkali metal compounds, Halides), (*Color centers, Halides), (*Halides, Color centers), Sulfates, Ions, X-rays, Impurities, Single crystals, Potassium compounds, Bromides, Chlorides, Absorption, Barium compounds, Solid solutions.

Two important effects of dissolved sulfate ions upon the properties of single-crystalline alkali halides have previously been reported. This report is concerned with a third effect which may be anticipated in view of the interactions between divalent anions and divalent cations in an alkali halide matrix. It has been known for some time that alkali halide crystals containing Ca or Sr additions may be colored much more rapidly and to a higher initial color-center concentration, by X-irradiation than relatively pure crystals. Whether the effect is due to the presence of positive-ion vacancies or to the specific properties of the divalent cations themselves is not yet ascertained, but it was supposed that sulfate ions, acting both to repress the positive-ion vacancy concentration and to form ion-pairs (or even a precipitated second phase of CaSO4 or SrSO4) should counteract the accelerating effect of the divalent cations. (Author)

AD-432 004 Div. 4, 25
OTS price $2.60

Oregon State U., Corvallis.
SULFATE IONS IN ALKALI HALIDE CRYSTALS. INFRARED ABSORPTION AND EFFECTS ON ADDITIVE COLORATION,
by E. Howard Coker and Allen B. Scott.
1 Aug 63, 28p. Rept. no. TR6
Contract Nonr128605, Proj. NR018 701
Unclassified report

Report on A Magnetic Study of Color Centers in Alkali Halides.

Descriptors: (*Alkali metal compounds, Halides), (*Halides, Infrared radiation), (*Color centers, Halides), Solid solutions, Sulfates, Ions, Potassium compounds, Chlorides, Absorption, Single crystals, Crystal growth, Distribution, Spectra (Infrared), Impurities, Radiography, Crystal structure, Calcium compounds, Cryogenics, Heat treatment, S band.

Recently it was reported that single crystals of KCl containing sulfate ions exhibited a surprisingly large number of IR absorption peaks unless the crystals also contained an excess of divalent cations, in which case the spectra consisted chiefly of three prominent absorbances. These were ascribed to the asymmetric stretching mode of sulfate, triply split by neighboring divalent cations. This report involves crystals in which the divalent cation concentration was much lower; the spectra are more complicated but some progress has been made in accounting for the peaks observed. A crystal-to-melt distribution ratio for sulfate ions is reported. A previous report describes some effects of sulfate ions on x-ray coloration. Here experiments with crystals containing sulfate ions which were then additively colored are reported. (Author)

AD-432 014 Div. 4, 14
OTS price .75

Rock Island Arsenal Lab., Ill.
SYNTHESIS OF ELASTOMERS CONTAINING BORON,
by Lynn G. Wiedenmann. 23 Jan 64, 19p.
Proj. 1A0 1050B010
RIAL 64 230 Unclassified report

An expanded version is available to U.S. Military Organizations only as AD-432 013L.

Descriptors: (*Heat resistant plastics, Boron compounds), (*Polyester plastics, Boron compounds), (*Organoboranes, Heat resistant plastics), (*Elastomers, Boron compounds), Synthesis (Chemistry), Inorganic polymers, Carboxylic acids, Chlorine compounds, Aging (Materials), Cyanates, Acrylic resins, Silanes, Aromatic compounds, Alkenes, Copolymerization, Decarboranes, Stability, Molecular structure, Vinyl plastics.

Monomers containing the 1, 2-dicarbaclovododecarborane unit (carborane, >C2 B10 H10) were prepared from substituted acetylenes and decarborane. A tough elastomer was produced by the emulsion copolymerization of butadiene and isopropenylcaborane. Polyesters were prepared from bis (hydroxymethyl) carborane and succinic, perfluoroglutaric, adipic and terphthalic diacid chlorides. The polycarborane adipate was a soft, tough, partially elastomeric material of low melting point. No press cure of this material was obtained, but with diisocyanate the material set up into a tough, leathery product. Other curing systems were attempted. Weight losses after air oven aging of the raw polyesters were obtained and found to be lower than a typical

commercial polyester. A polymer prepared from bis (acryloxymethyl) carborane and methylphenylsilane was highly crosslinked. An analogous polymer, but without boron, was prepared from butylene dimethacrylate and methylphenylsilane. (Author)

AD-432 035 Div. 4
OTS price $7.60

Imperial Coll. of Science and Tech., London (Gt. Brit.).
KINETICS OF THERMAL AND PHOTOCHEMICAL DECOMPOSITION OF SOME ALKALI METAL AZIDES.
Final technical rept.
31 Jan 64, 74p.
Contract DA91 591EUC2059

Unclassified report

Descriptors: (*Pyrolysis, Azides), (*Azides, Decomposition), (*Sodium compounds, Azides), (*Cesium compounds, Azides), (*Rubidium compounds, Azides), (*Photochemistry, Azides), (*Reaction kinetics, Pyrolysis), Crystals, Heat of activation, Impurities, Ultraviolet radiation, Low-pressure research, Nitrogen.

Reproducible results for the thermal decomposition of sodium azide were obtained by (1) precipitating the salt as a fine powder from aqueous solutions acidified with hydrazoic acid, and (2) decomposing it in the form of small pellets under argon. Both methods yield a value of 38 kcal/mol for the activation energy. When sodium azide is irradiated with UV light the rate of photolysis at first decreases and then becomes constant. Two reaction mechanisms are involved; the first occurs only in salt which has not previously been irradiated while the second one requires the presence of metallic sodium. Rubidium azide resembles potassium azide in that the rate of photolysis at first decreases, passes through a minimum and then increases, finally becoming constant. The rate of photlysis of cesium azide decreases, becomes constant for a brief period and then decreases again before becoming constant. (Author)

AD-432 136 Div. 4, 14
OTS price $2.60

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
INVESTIGATIONS IN THE FIELD OF SILICON-NITROGEN COMPOUNDS, INCLUDING POLYMERS.
Technical rept., 1 July 61-31 Dec 62,
by Dieter Kummer. Jan 63, 29p.
Contract Nonr186613

Unclassified report

Descriptors: (*Organic nitrogen compounds, Silicon compounds), (*Polymers, Silicon compounds), Synthesis (Chemistry), Aromatic compounds, Amines, Silanes, Spectra (Infrared), Nuclear magnetic resonance, Chlorine compounds, Ammonia, Cyclohexanes, N-heterocyclic compounds, Polycyclic compounds, Metalorganic compounds.

AD-432 303 Div. 4
OTS price $5.60

Washington U., Seattle.
SECONDARY INTERMOLECULAR KINETIC ISOTOPE EFFECTS IN THE METHYLENE RADICAL -- CIS-BUTENE-D SUB 8 -- CIS-1,2-DIMETHYLCYCLOPROPANE-D SUB 8 SYSTEM,
by J. W. Simons and B. S. Rabinovitch. 10 Mar 64, 51p.
Contract Nonr47736

Unclassified report

Descriptors: (*Reaction kinetics, Hydrocarbons), (*Hydrocarbons, Synthesis (Chemistry)), Free radicals, Ketenes, Cycloalkanes, Photochemistry, Molecular structure, Deuterated compounds, Excitation, Molecular isomerism, Heat of activation, Alkanes, Alkenes, Chromatographic analysis, Gases, Spectra (Infrared), Oxygen, Interference, Equations of state, Quantum statistics, Low-pressure research, Isotopes.

A study of the geometric and structural isomerization reactions of chemically activated cis-1,2-dimethylcyclopropane is reported. Activation was by addition of methylene from the photolysis of ketene to the double bond of cis-butene. The measured intermolecular isotope effects for the geometric isomerization and for one of the structural isomerization reactions are, for the most part, secondary quantum statistical-weight effects. The effect on other structural isomerization processes is a mixed primary-secondary isotope effect. Theoretical calculation of rates and of isotope effects are in fairly good agreement with experimental values. (Author)

AD-432 304 Div. 4
OTS price $3.60

Washington U., Seattle.
SECONDARY ISOTOPE EFFECTS IN THE CHEMICALLY ACTIVATED SEC-BUTYL-D SUB 0 AND -D SUB * SYSTEMS AND SEC-BUTYL-D SUB 1 AND -D SUB 9 SYSTEMS,
by J. W. Simons, B. S. Rabinovitch and R. F. Kubin. 10 Mar 64, 36p.
Contract Nonr47736

Unclassified report

Descriptors: (*Hydrocarbons, Synthesis (Chemistry), (*Reaction kinetics, Free radicals), Deuterated compounds, Alkenes, Alkanes, Low-pressure research, Low-temperature research, Heat of activation, Quantum statistics, Isotopes, Chromatographic analysis, Gases, Disproportionation.

The decomposition of chemically activated sec-butyl- radicals, produced by H- and D- atom addition to cis-butene-2 has been studied at 195 and 300 K over a range of pressures. These measurements, as well as internal comparison experiments with cis-butene-2, reveal a large normal secondary intermolecular kinetic isotope ratio which varies with the pressure and temperature, and whose minimum value is a factor of 4 and whose maximum value averages around 7. The absolute magnitude of the ratio, and its temperature, pressure, and energy dependence are in satisfactory agreement with the theory of these chemical activation systems; some aspects of this dependence are discussed. Evidence against a significant mechanistic isotope effect on the energetics is presented. Calculated isotope effects for all of the possible sec-butyl radical systems, to be formed by H- and D-atom addition to butene-d subzero and -d sub 8. (Author)

AD-432 392 Div. 4, 14
OTS price $2.60

Midwest Research Inst., Kansas City, Mo.
SYNTHESIS OF ELASTOMERS CONTAINING Si-N BONDS IN THE MAIN CHAIN.
Summary rept. no. 3, 1 July-31 Dec 63,
by L. W. Breed and R. L. Elliott. 17 Feb 64, 22p.
Contract DA23 072ORD1687, Proj. 593 32 002, 2531C

Unclassified report

Descriptors: (*Silicon compounds, Polymerization), (*Polymers, Silicon compounds),

(*Organic nitrogen compounds, Silicon compounds), (*Elastomers, Synthesis (Chemistry)), Molecular isomerism, Cyanates, Phenols, Organic solvents, Polycyclic compounds, Stability, Hydrolysis, Chemical analysis, Monocyclic compounds.

Polymers with substantially improved hydrolytic stability have been prepared by the condensation of N-substituted cyclotrisilazanes with bisphenol A. Model silazane compounds were used to study potential methods of crosslinking silazane-diol polymers. (Author)

AD-432 407 Div. 4, 14
OTS price $1.10

Frick Chemical Lab., Princeton U., N. J.
MEASUREMENT OF RANDOM SCISSION BY STRESS RELAXATION IN POLYSULFIDE AND OTHER NETWORKS: WEAK LINKAGES,
by Arthur V. Tobolsky. Mar 64, 8p. Technical rept. no. RLT74
Contract Nonr185807, Proj. NR356 377
Unclassified report

Descriptors: (*Polyethylene plastics, Sulfides), (*Stresses, Chemical bonds), (*Rupture, Recombination reactions), (*Reaction kinetics, Rupture), Isocyanate plastics.

AD-432 590 Div. 4, 14
OTS price $.75

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
APPLICATION OF PYROLYTIC GAS CHROMATOGRAPHY TO THE ANALYSIS OF THERMOSETTING ACRYLIC COATING RESINS,
by George G. Esposito. 4 Feb 64, 19p.
Proj. 1HO 24401A110 05
CCL 157 Unclassified report

Descriptors: (*Thermosetting plastics, Acrylic resins), (*Acrylic resins, Chromatographic analysis), Pyrolysis, Esters, Aromatic compounds, Hydrocarbons.

This investigation was conducted to determine the applicability of pyrolytic gas chromatography to the analysis of thermosetting acrylic resins. Primary interest is in the hydroxy functional thermosetting acrylic resins, particularly those prepared from hydroxy ethyl methacrylate and hydroxy propyl methacrylate. The identification of all the major components is possible in a relatively short period of time using minimal samples. The degradation products from the pyrolysis of the resinous material occur in the helium stream and are separated and identified on polar and nonpolar columns. (Author)

AD-432 594 Div. 4, 14, 9
OTS price $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
AEROTHERMOCHEMICAL BEHAVIOR OF GRAPHITE AT ELEVATED TEMPERATURES,
by S. M. Scala and L. M. Gilbert. Nov 63, 30p.
Rept. no. R63SD89
Unclassified report

Descriptors: (*Graphite, High temperature research), High pressure research, Low temperature research, Oxidation, Sublimation, Transition temperature, Enthalpy, Stagnation point, Boundary layer, Reaction kinetics, Ablation.

In this paper are presented the results of a unified theoretical treatment of the graphite ablation process, including heat and mass transfer correlation equations, over the entire range of pressures and surface temperatures of interest, i.e. from room temperature up to 10,000 F. (Author)

AD-432 599 Div. 4, 17, 25, 10, 6
OTS price $12.00

Rocketdyne, Canoga Park, Calif.
RESEARCH IN THE CHEMICAL, PHYSICAL, AND METALLURGICAL SCIENCES.
Final rept., 25 June 62-10 Dec 63,
by B. L. Tuffly, R. E. Bell, H. G. Offner, I. Lysyj and R. C. Greenough. Feb 64, 170p.
Rept. no. 5462
Contract AF04 611 8502, Proj. 3850, Task 385004
RTD TDR64 21 Unclassified report

Descriptors: (*Scientific research, Chemistry), (*Cryogenics, Liquid rocket propellants), (*Liquid rocket propellants, Chemical analysis), Membranes, Electrodes, Pentaboranes, Oxygen compounds, Fluorine compounds, Chlorine compounds, Hydrogen, Neon, Separation, Fluorine, Polarographic analysis, Infrared detectors, Hydrazine, Impurities, Nitrogen compounds, Boron compounds, Monocyclic compounds, Polymers, Pyrolysis, Detectors, Liquefied gases, Reviews, Filters (Fluid), Feasibility studies.

A membrane electrode as a detector for pentaborane gas is described. The fastest-responding detector has a gelled electrolyte covering the electrode. An infrared detection system for mounting on an Avco shock tube is described. A literature search dealing with the analysis and nature of contaminants in cryogenic fluorine and hydrogen is reported. An infrared fingerprint was obtained for the solid materials from a pentaborane-hydrazine firing. It is shown that these products are very similar to commercial boron nitride. A method for determining hydridic hydrogen on a microscale was developed. (Author)

AD-432 781 Div. 4
OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
PHOTO-INDUCED PHASE CHANGES IN LOW-TEMPERATURE GLASES,
by Seymour Siegel and Henry S. Judeikis.
12 Feb 64, 24p. Rept. no. TDR 269 4240 30 4
Contract AF04 695 269
SSD TDR63 376 Unclassified report

Descriptors: (*Ultraviolet radiation, Free radicals), (*Free radicals, Cryogenics), Electrons, Paramagnetic resonance, Phase studies, Transition temperature, Excitation, Impurities, Heat of activation, Line spectrum, Ethers, Alcohols.

The uv irradiation of ether and ethanol at 77 K leads to the formation of trapped ethyl radicals via an excited impurity-solvent interaction. The radicals were observed by the use of electron paramagnetic resonance (EPR) spectroscopy both during the irradiation and during the postirradiation period. The spectral shape changed as a function of time upon light extinction and also of temperature during irradiation. The qualitative kinetics of the spectral changes were examined in some detail. The following model is proposed to explain the experimental observations: The radicals are formed surrounded by a metastable local high-temperature phase region (corresponding to an equilibrium temperature > 115 K). In this high-temperature phase region, there is more

freedom for internal rotation or other molecular motions (but no translation). The metastable phase is maintained because the impurity still absorbs energy from the radiation field which is subsequently dissipated into heating the local environment. The resultant high temperatures are quickly quenched, thereby trapping the high-temperature phase. Light extinction leads to a decay of the high-temperature phase into one of two more stable, but also more rigid, phases, leading to changes in the shape of the radical EPR spectra. (Author)

AD-432 971 Div. 4, 11
OTS price $.50

Naval Research Lab., Washington, D. C.
THE SULFATE CYCLE FOR CARBON DIOXIDE REMOVAL AND OXYGEN GENERATION.
Final rept.,
by A. L. Pitman and S. T. Gadomski. 18 Feb 64, 15p.
Proj. SF013 08 03, Tasks 4092, 4093
NRL 6033 Unclassified report

Descriptors: (*Submarines, Atmospheric pollution), (*Purification, Air), Nuclear-powered vessels, Electrolytic cells, Anodes (Electrolytic cell), Oxygen, Sulfuric acid, Cathodes (Electrolytic cell), Hydrogen, Sodium compounds, Hydroxides, Carbon dioxide, Diaphragms (Mechanics), Rubber, Porosity, Asbestos, Sulfates.

A laboratory-scale plant of the sodium sulfate cycle system for oxygen generation and carbon dioxide removal aboard nuclear-powered submarines has been constructed and operated. Joint operation of the major components, each of which had previously been separately evaluated in the laboratory, was considered successful. The diaphragms used in the electrolytic cell were expected to provide difficult problems, and although asbestos diaphragms were known from the start to have a limited usefulness under anodic conditions, they proved to be more troublesome than anticipated. Fortunately, a diaphragm research group was able to recommend a replacement material, and using microporous rubber diaphragms in miniature electrolytic cells, achieved several continuous runs of 125 days. (Author)

AD-432 973 Div. 4, 7
OTS price $1.60

New York State Coll. of Ceramics, Alfred U.
HYDROGEN-OXYGEN ELECTRODE STUDY.
Quarterly progress rept. no. 9.
15 Mar 64, 11p.
Contract AF33 657 7564
Unclassified report

Descriptors: (*Electrodes, Fuel cells), (*Fuel cells, Electrodes), (*Hydrogen, Electrodes), (*Oxygen, Electrodes), Impregnation, Nickel, Capacitance, Electrical double layer, Palladium compounds, Platinum compounds, Chlorides, Ultrasonic radiation, Potassium compounds, Hydroxides, Electroplating, Porous metals.

A number of different electrochemical studies was undertaken and completed during the period of this report. These investigations were designed to aid in understanding the role of the catalyst on the hydrogen electrode in a fuel cell and also to develop techniques for deposition of the catalyst. (Author)

AD-432 997 Div. 4
OTS price $5.60

Rome U. (Italy).
CONDUCTANCE OF SOME ALKALI HALIDES IN WATER-GLYCEROL AND IN WATER-ETHYLENE GLYCOL MIXTURES AT 25 C.
Final technical rept., 1 Jan-31 Dec 63,
by Filippo Accascina. 31 Dec 63, 60p.
Contract DA91 591EUC2810
Unclassified report

Descriptors: (*Solutions, Electrical conductance), (*Electrical conductance, Mixtures), (*Mixtures, Electrical conductance), Glycols, Alcohols, Sodium compounds, Chlorides, Lithium compounds, Water, Dielectric properties, Viscosity, Electrochemistry.

The electrical conductance of sodium chloride and of lithium chloride in water-ethylene glycol mixtures has been measured. The water-ethylene glycol mixture covers a range of dielectric constants equivalent to water-glycerol mixtures with viscosity varying by a factor of one hundred, going from pure water to pure glycol. (Author)

AD-432 978 Div. 4, 14
OTS price $2.60

Colorado U., Boulder.
RUBBER RESEARCH; THE SYNTHESIS OF SPECIAL FLUORINE-CONTAINING MONOMERS.
Quarterly progress rept. no. 8, 1 Jul-1 Oct 63,
by J. D. Park and J. R. Lacher. 20 Oct 63, 30p.
Contract DA19 129QM1926, Proj. 01 6028 62
Unclassified report

Descriptors: (*Fluorine compounds, Cyclobutenes), (*Cyclobutenes, Synthesis (Chemistry)), (*Polycyclic compounds, Cyclobutenes), Halogenated hydrocarbons, Cyclobutanes, Monocyclic compounds, Alkenes, Grignard reagents, Bromine compounds, Chlorine compounds, Ethers, Ketones, Iodine compounds, Cyanates, Heterocyclic compounds, Chemical reactions, Elastomers, Stability, Heat resistance plastics, Complex compounds.

Synthesis and study of fluorinated three and four-membered rings is in progress. A preferable route for the preparation of the ''dibox'' compounds was developed. Use of grignard reagents in the synthesis of cyclic monomers is reported. (Author)

AD-433 045 Div. 4, 25
OTS price $1.60

Leicester U. (Gt. Brit.).
ION-ION AND ION-SOLVENT INTERACTIONS.
Annual technical rept. Jan-Dec 63,
by M. C. R. Symons. Dec 63, 15p.
Contract DA91 591EUC2799
Unclassified report

Descriptors: (*Ions, Alkali metal compounds), (*Hydroxides, Glass), (*Solvent action, Glass), Spectrophotometers, Optical glass, Gamma rays, Cryogenics, Liquefied gases, Nitrogen, Electrons, Pellets, Sodium compounds, Potassium compounds, Rubidium compounds, Heavy water, Absorption spectrum.

AD-433 047 Div. 4
OTS price $1.10

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia Pa.
ANALYTICAL METHODS IN SPECIFICATIONS, IMPROVEMENT

OF.
11 Mar 64, 3p.
NAEC AML 1858 Unclassified report

Descriptors: (*Infrared spectrophotometers, Standardization), Calibration, Styrene plastics, Chemical analysis, Liquefied gases, Oxygen.

AD-433 060 Div. 4
OTS price $1.60

Minnesota U., Minneapolis.
THE MECHANISM OF ELIMINATION FROM BETA-FUNCTIONAL ORGANOMERCURIALS.
Final rept.,
by Maurice M. Kreevoy. 7 Feb 64, 12p.
Contract AF49 638 711, Grant AF AFOSR16 63
AFOSR 64 0283 Unclassified report

Descriptors: (*Mercury compounds, Metalorganic compounds), (*Metalorganic compounds, Mercury compounds), (*Chemical reactions, Mercury compounds), Ethers, Catalysis, Acids, Reaction kinetics, Electron transitions, Isomeric transitions, Decomposition, Protons, Iodides.

AD-433 231 Div. 4
OTS price $.75

Materials Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
X-RAY CRYSTALLOGRAPHIC AND POWDER DATA FOR SOME FERROCENE DERIVATIVES.
Rept. for June-Nov 63,
by David W. Fischer. Feb 64, 22p.
Proj. 7360, Task 736005
ML TDR64 23 Unclassified report

Descriptors: (*Ferrocenes, X-ray diffraction analysis), (*Complex compounds, Ferrocenes), Crystal lattices, Crystal structure, Physical properties, X-ray photography, Tables, Iron compounds.

Results are shown for X-ray crystallographic and X-ray powder diffraction analysis of ferrocene and fourteen ferrocene derivatives. Sata include lattice parameters, space group, molecules per cell, density, melting point, color, formula, and indexed power pattern of each compound. (Author)

AD-433 243 Div. 4
OTS price $1.10

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
PAN 2-19, SAFETY SOLVENT, FOR USE IN ENCLOSED SPACES, DEVELOPMENT OF SPECIFICATION REQUIREMENTS FOR.
23 Mar 64, 1p.
NAEC AML 1912 Unclassified report

Descriptors: (*Solvents, Specifications), (*Cleaning compounds, Naval equipment), Maintenance, Hazards, Toxicity.

5. COMMUNICATIONS

AD-431 271 Div. 5, 25
OTS price $2.60

Keystone Electronics Co., Newark, N. J.
5 MC SINGLE SIDEBAND CRYSTALS.
Quarterly progress rept. no. 1, 1 July-30 Sep 63, by Raymond F. Woolley. 30 Sep 63, 27p.
Contract DA36 039AMC03307E
Unclassified report

Descriptors: (*Crystals, Voice communication systems), (*Voice communication systems, Crystals), Quartz, High frequency, Crystal structure, Electrical properties, Specifications, Aging (Materials), Electric terminals, Aluminum, Temperature, Frequency shift, Performance (Engineering), Standards.

The requirements and previous literature which indicates that Q of 3 x ten to the 6th is possible at a frequency of 5 mc. To reach the desired Q, it is indicated that a plano-convex blank is necessary, together with evacuation of the unit in a glass holder. Maintenance of angle of orientation to ±15 seconds of the Z-Z' will be necessary to achieve the desired change in frequency. Proposed improvement to the frequency standard and measurements system are detailed, as well as a description of an oven to be used for aging measurements. The complete prototype crystal unit design specification is included. (Author)

AD-431 288 Div. 5
OTS price $1.10

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
IRIG STANDARD FORMAT FOR DATA TRANSMISSION.
Feb 64, 10p.
IRIG 102 63 Unclassified report

Descriptors: (*Data transmission systems, Standards), (*Coding, Standards), (*Teletype systems, Coding), Trajectories, Tracking.

This standard specifies a format for use in transferring trajectory-type data between ranges or between elements of a global range. The initial teletype format devised spelled out decimal numbers for data words. Since this approach produced a capacity of only twelve samples per minute, the sexadecimal (base 16) coding presented herein was adopted. Twenty samples per minute are available. Since the sexadecimal system requires only four of the five bits available in each Baudot code character, the fifth bit has been used for insertion of transverse parity. Additionally, one character is added to each data sample for longitudinal parity, thus providing a capability for correcting one error per sample. This format is applicable to the ASA eight-level standard recently adopted, and recommended coding is included. (Author)

AD-431 564 Div. 5
OTS price $3.60

ITT Communication Systems, Inc., Paramus, N. J.
EUROPEAN-MEDITERRANEAN TROPOSPHERIC SCATTER COMMUNICATION SYSTEM EQUIPMENT PERFORMANCE SPECIFICATIONS, AMENDMENT 1.
1 Feb 62, 40p.
Contract AF19 626 4
ESD 64 224 Unclassified report

Descriptors: (*Communication systems, Specifications), Scattering, Troposphere, Communication equipment, Performance (Engineering).

An ammendment to the equipment performance specifications is presented for the European- Mediterranean tropospheric scatter communications system. This amendment to Specification ICS-61-SPEC-101 through 112 and 114 reflects the status of the system effective 1 February 1962.

AD-431 584 Div. 5
OTS price $7.60

ITT Communication Systems, Inc., Paramas, N. J.
EUR-MED COMMUNICATION SYSTEM BASE AREA AND SYSTEM TERMINALS GENERAL PERFORMANCE SPECIFICATION,
31 Aug 62, 79p. 62 Specification 130
Contract AF19 626 4
ESD TDR64 222 Unclassified report

Descriptors: (*Global communication systems, Specifications), Air force, Data transmission system, Troposphere, Scattering, Communication systems, Military facilities, Performance (Engineering), Standards, Circuits, Maps, Micorwave communication systems, Voice communication systems, Telegraph systems, Bandwidth, Telephone communication system, Power supplies, Test facilities, Reliability, Military requirements, Maintainability, Tests, Test methods.

This specification covers the integration of the European-Mediterranean Tropospheric Scatter Communications System (EUR-MED Tropo) as defined in Specification ICS-61-SPEC-100 with the Base Area Communications systems on the military bases served by this system and with adjacent military and civilian communications systems. This specification is of a general nature and is intended to be for the application of the transmission performance standards. Typical circuits are given for the purpose of illustrating the performance standards and objectives. It is not the intent of this specification that these typical circuits be made mandatory. Figure 130-1 shows the system as originally contemplated; its relationship to the rest of the European complex; and the location of the bases. The map includes the branches throughout Europe and extending into Africa and Asia Minor. The system will interconnect the trunk stations and military base sites using both tropospheric scatter and line-of-sight microwave propagation. (Author)

AD-431 586 Div. 5
OTS price $1.60

Electronic Systems, Div., Air Force Systems Command, Bedford, Mass.
RELIABILITY PROGRAMS FOR ''L'' SYSTEMS,
by James R. Barton and George H. Allen. 1963, 19p.
ESD TDR63 674 Unclassified report

Paper presented at the Seventh Military-Industry Missile-Space Reliability Symposium, San Diego, Calif., June 62.

Descriptors: (*Command and control systems, Reliability), Air Force Systems Command, Maintainability, Military requirements, Antimissile defense systems, Early warning systems, Search radar, Air control centers, Air Defense Command, Antiacraft defense systems, Guided missiles (Surface-to-air), Army, Display systems, Symposis, Specifications, Electronic equipment.

The AFSC Program Structure assigns numbers and letters to the vaious programs in order to identify the efforts for management control. Command and control systems have the designator L. In this paper the mission of L systems has been described, the complexity of the equipment indicated, and the importance of these systems to our national defense is stressed. (Author)

AD-431 639 Div. 5
OTS price $1.10

ITT Communication Systems, Inc., Paramus, N. J.
MESSAGE STANDARDS FOR G/A/G DIGITAL COMMUNICATIONS.
24 Sep 62, 10p. Rept. no. ICS62TR104
ESD TDR64 228 Unclassified report

Descriptors: (*Communication systems, Digital systems, (*Digital systems, Standards), (*Standards, Communication systems), Surface-to-air, Air-to-surface, Voice communication systems, Synchronization (Electronics), Data transmission systems.

This document provides message standards for use in designing ground-aerospace-ground digital communications, including digitally initiated voice communications. It presents those message characteristics for which common or compatible standards between commercial and military data systems are necessary. (Author)

AD-431 668 Div. 5
OTS price $17.50

Army Electronics Research and Development Agency, Fort Monmouth, N.J.
TELEPHONE-TELEGRAPH CARRIER TERMINAL TA-5006A/U.
27 Jan 64, 278p.
Unclassified report

Descriptors: (*Telephone equipment, Multiplex). (*Telegraph equipment, Multiplex). (*Multichannel telephone systems, Multiplex). Performance (Engineering), Human engineering, Military requirements, Tests, Wiring diagrams, Tables, Maintenance.

An engineering test was performed on Telephone Telegraph Carrier TA-5006A/U and efforts were made to determine its compatibility with other Standardized Military equipment. The Test Report consists of two (2) main sections: operation test and service conditions tests. In addition to the operation and service condition tests the following tests and review were performed: a. Equipment compatibility tests, b. Component and maintenance review, c. Human factors engineering review. (Author)

AD-431 743 Div. 5
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
HARD LINE VS MICROWAVE LINK TRADE-OFF STUDY VAFB/NMFPA DATA TRANSMISSION SYSTEM,
by R. P. McGarrity. Jan 64, 20p. Rept. no. TOR269 4110 03 2
Contract AF04 695 269
Unclassified report

Descriptors: (*Data transmission systems, Management engineering), (*Transmission lines, Data transmission systems), (*Microwave communication systems, Data transmission systems), Tables, Hardening, Costs, Radiofrequency interference, Bandwidth, Ranges (Distance), Secret communication systems, Guided missile ranges.

The results of a limited study on the relative merits of hardwire and microwave link transmission characteristics related to the transmission of data over moderate distances are summarized. This study is one of a number that was performed in connection with the Vandenberg Air Force Base Navy Missile Facility Point Arguello Instrumentation Study conducted by the Aerospace Satellite Control Office with extensive support from the Telecommunications and Tracking Department and other Aerospace Corporation organizations. Parameters considered in this study were: security, electromagnetic interference, data quality and reliability, total bandwidth capacity, single channel bandwidth capacity, hardness, flexibility, effect of link length, and cost comparison. (Author)

AD-431 783 Div. 5
OTS price $11.00

ITT Communication Systems, Inc., Paramus, N. J.
EUR-MED COMMUNICATION SYSTEM BASE AREA AND SYSTEM TERMINALS EQUIPMENT PERFORMANCE SPECIFICATIONS. ICS-62-SPEC-150, 151, 153 THRU 167.
31 Aug 62, 141p.
Contract AF19 626 4
ESD TDR64 223 Unclassified report

Descriptors: (*Voice communication systems, Specifications), (*Test sets, Specifications), Miliatry facilities, Test facilities, Radio transmission, Communication equipment, Networks, Radio relay systems, Telephone communication systems, Telegraph systems, Transmission lines, Telephone lines, Test equipment (Electronics).

This specification covers the performance requirements for a voice frequency test and patch board for use at the terminations of four-wire voice frequency channels. The equipment provides facilities for transmission testing of the voice channels and for patching circuits from normally assigned facilities to alternate facilities for restoral or rerouting of the communication circuits. For installations requiring the termination of only a small number of four-wire voice frequency channels, the two-wire patch and test facilities of the Voice Service Patch and Test Board are incorporated so as to provide a combined test and patch facility for four-wire and two-wire circuits. (Author)

AD-431 882 Div. 5
OTS price $9.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
STUDY AND INVESTIGATION OF POLARIZATION PROGRAMMING.
Interim rept.,
by R. S. Berkowitz, R. F. Schwartz, C. Muzzi, J. Choder and R. G. Mulholland. Feb 64, 115p.
Rept. no. 64 08, 2
Proj. 4540, Task 454003
RADC TDR63 542 Unclassified report

Subcontract to American Electronic Labs., Colmar, Pa., Contract AF30 602 3105.

Descriptors: (*Polarization, Communication systems), (*Communication systems, Polarization), Electromagnetic waves, Propagation, Statistical analysis, Scattering, Troposphere, Mathematical models, Signal to noise ratio, Atmosphere, Reflection, Attenuation, Equations, Refractive index.

The work described in this report represents continuation of the work reported in Report no. 1, Study and Investigation of Polarization Programming, Vol. II - Polarization Systems Analysis.

Three different aspects of the work are presented in detail. First a study of propagation properties of the troposphere for tropospheric scatter communication is concluded. The main result of this study is the fact that all available evidence indicates that transmitted polarization properties will be essentially preserved through the medium up to the point of reception. However, while it is found that it would be profitable to design a communication system accordingly, a study should be made experimentally to further verify the existence of this transmission characteristic. A second study reported herein has to do with construction of a statistical model of the propagation medium consistent with our knowledge of scatter propagation characteristics that can be used as the basis of system design. Such a channel model incorporating random fading statistics has been set up. (Author)

AD-432 244 Div. 5, 8
OTS price $2.75

Institute of Science and Tech., U. of Michigan, Ann Arbor.
APPLICATION OF SWEPT-FREQUENCY MODULATION TECHNIQUES TO PCM TELEMETRY.
Final rept., May 62-Aug 63,
by E. K. Holland-Moritz and J. C. Dute. Jan 64, 122p. Rept. no. 5097 17F
Contract AF33 657 8840, Proj. 4107, Task 410715
RTD TDR63 4126 Unclassified report

Report on Telemetry and Command Destruct Techniques.

Descriptors: (*Telemeter systems, Pulse modulation), (*Pulse modulation, Frequency modulation), (*Frequency modulation, Sweep generators), (*Sweep generators, Frequency modulation), Doppler effect, Errors, Noise (Radio), Radio interference, Digital systems, Bandwidth, Coding, Power, Delay lines, Filters (Electromagnetic wave), Radio receivers, Radio transmitters, Detectors, Data transmission systems.

This report gives design criteria for the application of the SFM technique to practical PCM telemetry systems. It compares optical, acoustic, and electrical techniques for generating and processing SFM signals, and it discusses the effects of doppler shift and multipath propagation on PCM/SFM signals. Error rates have been calculated for a PCM/SFM telemetry link operating in the presence of simultaneous gaussian and impulse noise. Errors due to single impulses, clusters of impulses, periodic impulses, and impulses having a Poisson distribution are treated. Computations are given for the approximate error rate when short channel interruptions or short fading periods are present. Consideration of the effects of impulse noise on SFM systems has indicated certain factors which may improve the performance of conventional PCM systems. Some of these factors are: clipping, the use of more than minimum bandwidth, and an awareness of the significance of the average number of noise pulses occuring during a bit period. (Author)

AD-432 458 Div. 5
OTS price $6.60

Aerospace Corp., Los Angeles, Calif.
WIDEBAND MAGNETIC TAPE RECORDING TECHNIQUES,
by John Stumberg. 15 Dec 63, 64p. Rept. no. TOR269 9990 1
Contract AF04 695 269
Unclassified report

Descriptors: (*Magnetic recording systems, Magnetic tape), (*Magnetic tape, Magnetic recording systems), (*Broadband, Magnetic recording systems), Reviews, Frequency modulation, Video signals, Signal-to-noise ratio, Coils, Configuration, Velocity, Rotation, Magnetic fields, Transients, Delay lines, Filters (Electromagnetic wave), Switching circuits.

AD-432 487 Div. 5, 8
OTS price $1.10

CBS Labs., Stamford, Conn.
242: QRC-214(T) WIDE BAND RECORDER AND SUPPORTING EQUIPMENT.
Informal technical monthly progress rept. no. 10, 16 Jan-15 Feb 64.
10 March 64, 8p. Rept. no. CLD1596
Contract AF33 657 10468
Unclassified report

Descriptors: (*Magnetic recording systems, Magnetic tape), (*Broadband, Magnetic recording systems), Airborne, Ground support equipment, Electromagnetic shielding, Oscillators, Production, Performance (Engineering), Power supplies.

The processing electronics for both the ground airborne systems were completed and adjusted. Measurments of the systems, operating on an overall electrical basis, showed response from dc to 10 mc and ability to process square waves and pulses of 0.1 microsecond duration. The airborne system was readied for environmental tests. Preliminary reference measurements were obtained and recordings perpared for evaluation purposes. The reproducing amplifiers of the ground system were wired to the reproducing head and processing electronics and found to be oscillating due to the inductive source impedance of the heads and added load on output circuits. The condition has been corrected and equalization of the recording-reproducing systems is now in process. (Author)

AD-433 046 Div. 5, 8
OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
PREDETECTION RECORDING STUDY,
by R. A. Hanson. 25 Nov 63, 51p. Rept. no. TDR269 4110 01 15
Contract AF04 695 269
SSD TDR63 361 Unclassified report

Descriptors: (*Magnetic recording systems, Ground support equipment), (*Satellites (Artificial), Tracking), (*Tracking, Satellites (Artificial)), (*Ground support equipment, Magnetic recording systems), Magnetic tape, Frequency modulation, Amplitude modulation, Pulse modulation, Nonlinear systems, Telemetering receivers, Bandwidth, Electrical properties, Costs, Specifications.

The report examines the predetection recording requirements of the Satellite Control Facility to confirm the present approach and recommend new concepts where feasible. The four basic techniques of recording data on magnetic tape are compared and a forecast of future requirements is made with the recommended recording technique given for each. Recommendations are made based on the conclusions of the study. (Author)

AD-433 087 Div. 5, 20
OTS price $19.75

Ling-Temco-Vought, Dallas, Tex.
A STUDY OF NUCLEAR RADIATION EFFECTS ON TELEMETRY. VOLUME I.
Feb 64, 332p.
Contract AF33 657 11646, Proj. 4107, Task 410721
RTD TDR63 4287, vol. 1 Unclassified report

Descriptors: (*Telemeter systems, Radiation damage), Space environmental conditions, Modules (Electronics), Nuclear particles, Design, Neutrons, Gamma rays, Photoelectric effect, Dose rate, Transients, Capacitors, Ionization, Printed circuits, Coaxial cables, Quartz resonators, Electric insulation, Nuclear power plants, Nuclear propulsion, Semiconductors, Electron tubes, Electromagnetic pulses, Van Allen radiation belt, Commutators, Coding, Telemetering transmitters, Magnetic tape, Magnetic recording systems, Modulation.

The primary objectives of this study were to (1) define representative nuclear radiation environments in which telemetry circuitry may be required to operate, (2) establish the capability of off-the-shelf telemetry modules to operate properly in these environments, and (3) evolve certain criteria and 'working tools' for the design of nuclear radiation tolerant telemetry. The general approach used in accomplishing these objectives was (1) to provide a brief discussion of the effects of nuclear radiation on materials and components, (2) to discuss potential nuclear radiation environmental combinations which might affect the design of a telemetry system, (3) to establish a Representative Telemetry System Mode (RTSM) which includes the pertinent building blocks which might be used in any specific system, (4) to compile, correlate, and present in a tabular format the applicable radiation effects information required to perform the detailed nuclear radiation effects analysis, and (5) to discuss certain criteria for the effective design of nuclear radiation tolerant telemetry modules. (Author)

AD-433 088 Div. 5, 20
OTS price $19.75

Ling-Temco-Vought, Dallas, Tex.
A STUDY OF NUCLEAR RADIATION EFFECTS ON TELEMETRY VOLUME II - NUCLEAR RADIATION EFFECTS DESIGN ALLOWABLES.
Feb 64, 301p.
Contract AF33 657 11646, Proj. 4107, Task 410721
RTD TDR63 4287, vol. II
Unclassified report

Descriptors: (*Telemeter systems, Radiation damage), Design, Nuclear particles, Batteries and components, Capacitors, Electrolytic capacitors, Ceramic capacitors, Tantalum capacitors, Paper capacitors, Coaxial cables, Electric connectors, Quartz resonators, Delay lines, Magnetic materials, Electrical equipment, Electronic equipment, Resistors, Transistors, Amplifiers, Oscillators, Power supplies.

Approximately 1500 nuclear radiation effects Design Allowables on electronic materials and parts were compiled to provide a useful working tool for designing nuclear radiation tolerant telemetry systems. The radiation effects Design Allowable is a nuclear radiation environmental exposure under which the associated material or part is expected to exhibit certain specified characteristic changes. The information presented does not include all available data, but is felt to be representative of the current nuclear radiation effects state-of-technology. This data should serve as an aid in performing nuclear radiation effects analyses of currently available telemetry systems and provide useful inputs for hardening such systems for use in a nuclear radiation environment. (Author)

AD-433 162 Div. 5, 8
OTS price $9.60

Technical Operations, Inc., Burlington, Mass.
SOME TECHNIQUES TO HELP IMPROVE METHODS FOR EXERCISING AND EVALUATING COMMAND AND EVALUATING COMMAND AND CONTROL SYSTEMS.
Summary rept.,
by Peter Kugel and Martin F. Owens. 31 Jan 64, 116p. Rept. no. B63 108
Contract AF19 628 2455, Proj. 2801
ESD TDR64 195 Unclassified report

Descriptors: (*Command and control systems, Mathematical models), Test methods, Effectiveness, Air Force, Decision making, Communication theory, Mathematical logic, Programming (Computers).

Four techniques are described to improve methods for exercising and evaluating command and control systems: (1) exercise flow diagram (generalizes and extends the techniques of flow charting for use in exercising); (2) resource assignment model (uses techniques of mathematical logic to describe the information processing in the command and control system); (3) expected utility model (uses techniques drawn from decision theory to describe decision making in a command and control system; and (4) finite automaton model (uses techniques from the theory of finite automata to describe the relationships between a command and control system and the system exercising it). (Author)

AD-433 200 Div. 5, 32
OTS price $5.60

ITT Communication Systems Inc., Paramus, N. J.
A HANDBOOK ON COMMUNICATION CODES. PART I. PERMUTATION CODES AND CODED-CHARACTER SETS.
31 Jan 64, 1v. Rept. no. 64TR364
Contract AF19 628 3358
ESD TDR64 241 Unclassified report

Descriptors: (*Communication systems, Coding), (*Handbooks, Coding), (*Coding, Handbooks), Typewriters, Teletype systems, Digital computers, Errors, Telegraph systems.

AD-433 211 Div. 5, 30
OTS price $8.60

ITT Federal Electric Corp., Paramus, N. J.
STRATEGIC AIR COMMAND CONTROL SYSTEM (465L).
Monthly test progress rept. no. 30, 21 Nov-20 Dec 63.
20 Jan 64, 94p. Rept. no. 20130
Contract AF19 626 8
ESD TDR64 197 Unclassified report

Descriptors: (*Management engineering, Strategic Air Command), (*Data transmission systems, Strategic Air Command), (*Command & control systems, Combat information centers), Programming (Computers), Display systems, Reliability (Electronics), Maintainability, Tests, Data processing systems, Human engineering, Instruction manuals, Operators (Personnel), Communication systems.

6. DETECTION

AD-431 310 Div. 6
OTS price $3.60

United Research Inc., Cambridge, Mass.
LOCALIZATION OF SOUND. PART 3. A NEW THEORY OF HUMAN AUDITION.
Dec 63, 34p.
Contract N123 60530 30283A
NOTS TP3109, pt. 3 Unclassified report

Descriptors: (*Sound, Detection), (*Hearing, Perception), Ear, Pitch discrimination, Communication theory, Attention, Acoustics, Sound pitch, Underwater sound.

Localization of sound by humans has been shown to depend on a transformation of incident sounds by the pinnae, or external ear. The ears function as a computer-steerable array similar to an electronically swept radar antenna. The form of transformation is that of time delays. Autocorrelation of the time delays by mental function provides localization. It has been found that the ability to localize sounds in another environment may be reproduced using microphones adapted with ear replicas and high-quality condenser headphones. Extension of this technique to underwater use has been effectively demonstrated, despite some component shortcomings. The experimental highlights that support the theory and the field tests to evaluate the operational utility of localizing systems are discussed. The basic concept of autocorrelation of time delays introduced by the pinna has been extended to speech recognition problems. A new theory of human audition, which ascribes significance to the time domain rather than the frequency domain, has been developed that explains not only binaural and monaural localization, but also the ''cocktail party effect,'' pitch discrimination, speech recognition, masking, intelligibility in reverberation, and other auditory phenomena. (Author)

AD-431 780 Div. 6
OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADAR BACKSCATTER FROM SOME LOW CROSS-SECTION SHAPES,
by A. F. Smith. 16 Jan 64, 37p. Group rept. no. 1964 3
Contract AF19 628 500
ESD TDR64 19 Unclassified report

Descriptors: (*Radar echo areas, Geometric forms), Scattering, Conical bodies, Spheres, Reduction, Measurement.

Radar backscattering measurements have been made on four low cross-section shapes. Results indicate that little improvement is found over the return from a cone-sphere. Comparison of measured data with approximate theoretical calculations shows fair agreement. (Author)

AD-431 792 Div. 6, 22
OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
PROJECT HYDRA-IRIS,
by James E. Hurtt and Ray N. Francis. Feb 64, 21p.
NOTS TP3391 Unclassified report

Descriptors: (*Sounding rockets, Radiometers), (*Horizon scanners, Sounding rockets), Oceans, Launching, Telemeter systems, Infrared radiation, Ultraviolet radiation, Floats, Remote control systems, Infrared detectors, Radar beacons, Ultraviolet detectors.

The Hydra-Iris is a two-stage system, employing a cluster of three Mk 6 Mod 0 Sparrow motors as a booster and an Iris sustainer that is capable of being launched from any spot on the ocean's surface. Two Hydra-Iris vehicles with payloads were designed to telemeter performance functions, to provide an insight into the feasibility of placing scientific payloads in a water-launched vehicle, and to supply telemetry data relating to the in-flight operation and reliability of two infrared radiometers and one ultraviolet radiometer that are so calibrated as to display a gradient or profile of the earth's terrestrial horizon. Two such vehicles were launched from approximately 500 miles at sea, and the 121-pound payloads were placed 182 statute miles above the earth's surface. Telemetry was received on the entire first flight. No trajectory was available, and only partial radar tracking was received on the second flight. The data is being analyzed and will be reported separately (Author)

AD-431 880 Div. 6
OTS price $14.00

Jansky and Bailey, Div. Atlantic Research Corp., Washington, D. C.
SPECTRUM SIGNATURE MEASUREMENTS ON AIR ROUTE SURVEILLANCE RADAR (ARSR -±B-A) AT POINT ARGUELLO, CALIFORNIA.
by Carl P. McCall. Mar 63, 205p.
Contract AF30 602 2537
RADC TDR63 363 Unclassified report

In cooperation with Frederch Research Corp., Weaton, Md.

Descriptors: (*Search radar, Radiofrequency spectroscopy), Radiofrequency interference, Radar transmitters, Test equipment, Calibration, Modulation, Frequency, Stability, Spectrum analysis, Microwave spectroscopy.

This report describes the spectrum signature measurements made on an Air Route Surveillance Radar (ARSR-1B-A) located at the U. S. Naval Missile Facility, Point Arguello, California. Description of the tests and results of the measurements are given for the ARSR-1B-A transmitter and were made in accordance with the specifications and procedures of MIL-STD-449A. Data reported herein will be used as an input to the DOD Electromagnetic Compatibility Analysis Center library of spectrum signatures. (Author)

AD-431 891 Div. 6, 5, 8
OTS price $2.60

Electronic Defense Lab., Mountain View, Calif.
PRELIMINARY DESCRIPTION OF THE EDL-R7 RECEIVING SYSTEM,
by Ronald G. Brown. 14 Oct 63, 24p. Rept. no. EDL G200
Contract DA36 039AMC00088E
Unclassified report

Descriptors: (*Radio receivers, Radio interception), (*Radio interception, Radio receivers), Specifications, Monitors, Amplitude modulation, Frequency modulation, Microwave frequency, Signal-to-noise ratio, Frequency converters, Multiplex, Mixers (Electronic), Amplifiers, Antennas.

System Description: The ED-R7 Receiving System is a channelized, superheterodyne receiving system capable of search and monitor functions for AM, FM, pulse and CW signals. Multiple combinations of electronic search and manual monitor tuners can be provided, each capable of independent operation from 250 Mc to 12 Gc. The system

can be operated from one or more antennas, which can be remotely located if sufficient preamplification is used to overcome transmission line losses. Preamplifiers and postamplifiers preceding the EDL-R7 system are not uniquely a part of the basic concept, but will be discussed below in terms of their effect on the overall system performance. A major feature of the system is its flexibility. It is capable of providing electronic search over wide frequency bands, while simultaneously concentrating multiple tuners in any specific frequency band or bands of high signal density. Further, additional search and/or monitor tuners may be added, or the ratio of search to monitor tuners changed, without system redesign. Typical performance figures include an 8- to 15-db noise figure and a 55- to 60-db dynamic range. (Author)

AD-431 917 Div. 6
OTS price $4.60

Lansdale Div. Philco Corp., Pa.
PEM FOR GOLD-DOPED GERMANIUM INFRARED DETECTOR TYPE IR400.
Quarterly progress rept. no. 4, 27 Sep-27 Dec 63, by R. J. Roode. 27 Dec 63, 47p.
Contract DA36 039AMC01464E, Proj. H200.
Unclassified report

Descriptors: (*Infrared detectors, Production), Quality control, Germanium, Impurities, Gold, Manufacturing methods, Barium compounds, Fluorides, Machine tools, Infrared windows, Blackbody radiation, Tests, Signal-to-noise ratio.

This report discusses work performed during the fourth quarterly period of a PEM for producing p-type, gold-doped germanium infrared detectors, type IR400. Work was concentrated on manufacturing and testing of preproduction samples; compilation of the Inspection and Quality Control Plan; and preparation of processing specifications with device, jig, and fixture drawings. About midway in the period, negotiations were completed for a change of scope of the contract to reduce the sensitive area to 1/2 mm x 1/2 mm. The change was authorized by Modification No. 2, effective 19 November 1963. Five detectors, with barium fluoride windows and sensitive area of 2 mm x 2 mm, were prepared as preproduction samples before the program change referred to above. All but one had a D meeting the original specification of 3 x 10 to the 9th power cm(cps)1/2/watt. Detailed test data on these samples are included in the appendix to this report. (Author)

AD-432 017 Div. 6, 2
OTS price $4.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
AN ANALYSIS OF AN/FPS-16 RADAR AND AN/GMD-1B RAWINSONDE DATA DIFFERENCES,
by Roy E. Sandlin, Jr. and Elias M. Armijo.
Feb 64, 42p.
Task 1A0 11001B021 10
ERDA 115 Unclassified report

Descriptors: (*Radar tracking, Meteorological balloons), Direction finding, Meteorological parameters, Radio receivers, Radiosondes, Wind, Atmospheric sounding.

A series of rawinsonde balloon flights has been tracked simultaneously by AN/GMD-1B rawin and AN/FPS-16 radar. The data acquired have been analyzed for height, wind speed, wind direction, and angular error under field operational conditions. Differences have been tabulated through the first 35,000 feet of the atmosphere and have shown significant AN/GMD-1B errors (under the assumption that AN/FPS-16 data are optimum). Mean error values are shown in order to establish a bias, and RMS deviation of error is shown as an indicator of precision of the AN/GMD system. (Author)

AD-432 066 Div. 6, 2
OTS price $23.50

Weather Bureau, Washington, D. C.
SEVERE STORM DETECTION AND CIRCUMNAVIGATION.
Final rept. for June 63,
by Jean T. Lee, Chester W. Newton and James Frankhauser. June 63, rev. Nov 63, 472p.
Contract ARDS A176, Projs. 206 4 1R; 206 4 4R
Unclassified report

Descriptors: (*Storms, Radar echo areas), Thunderstorms, Turbulence, Doppler radar, Wind, Air traffic, Weather forecasting.

Contents: Thunderstorm turbulence measurements by air-craft and concurrent radar echo evaluations; Investigation of severe storms with pulse Doppler radar; 500-kc./sec. sferics studies in severe storms; Movements and patterns of development of thunderstorms; Some relations between thunderstorm radar echoes and surface wind fields; On vectoring aircraft through thunderstorms; and Analysis of the severe weather factor in automatic control of air route traffic. (Author)

AD-432 226 Div. 6
OTS price $5.60

David Taylor Model Basin, Washington, D. C.
AUTEC ACOUSTIC TRACKING SYSTEM,
by Charles G. McGuigan and C. Leland Bolen.
Jan 64, 59p.
DTMB 1808 Unclassified report

Descriptors: (*Submarines, Tracking), (*Tracking, Submarines), Acoustic detectors, Hydrophones, Underwater sound signals, Underwater sound, Laboratories, Shipborne, Transducers, Acoustic ranges, Test facilities.

This report describes the Acoustic Tracking System to be used during operation of the Atlantic Undersea Test and Evaluation Center (AUTEC) Acoustic Range. The system is designed primarily to track a submarine relative either to a floating vertical array (MONOB-I) or to a bottom-mounted fixed array of noise-measuring hydrophones (AUTEC). (Author)

AD-432 775 Div. 6, 8
OTS price $3.60

Electronic Defense Lab., Mountain View, Calif.
A COMPARATIVE STUDY OF LOW-ANGLE TRACKING SYSTEM PERFORMANCE,
by R. E. Franks and V. C. Sundberg. 25 Nov 63, 34p. Rept. no. TM M541
Contract DA36 039AMC00088E
Unclassified report

Descriptors: (*Radar tracking, Performance (Engineering)), (*Detectors, Radar scanning), Radar antennas, Errors, Programming (Computers), Targets, Reflection, Monopulse radar.

A theoretical study which compares conical-scan, amplitude-monopulse, and phase-monopulse tracking systems is presented. The study examines each tracking system's performance (a) in the absence of reflections, and (b) when reflections are present. A program for computing tracking errors is discussed. (Author)

Division 6 - DETECTION

AD-432 843 Div. 6
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
THE INFLUENCE OF RANDOM PHASE ERRORS ON THE EDGE RESPONSE OF SYNTHETIC-APERTURE MAPPING RADAR SYSTEMS,
by Jean A. Develet, Jr. 4 Mar 64, 19p. Rept. no. TDR269 9990 4
Contract AF04 695 269
SSD TDR64 26 Unclassified report

Descriptors: (*Mapping, Radar equipment), (*Radar, Mapping), Phase distortion, Errors, Terrain, Radar reflections, Radar antennas, Matched filters, Roads, Rivers, Scattering, Antenna radiation patterns, Azimuth, Resolution, Radiofrequency power, Equations.

The influence of small random phase errors on the edge response of an idealized synthetic-aperture mapping radar is treated. The target field considered is homogeneous rough terrain which suddenly changes reflectivity. The ideal system discussed has Gaussian real antenna beams and uses matched filtering to obtain fine azimuth resolution. The measure of system performance is the ensemble average power output. The results can assist in determining the effect of phase errors on the ability of synthetic-aperture mapping radars to discern roads, rivers, ravines, or any terrain features which can be accurately characterized by a sudden change in reflectivity with a fairly homogeneous scattering medium on either side of the demarcation. (Author)

AD-433 147 Div. 6
OTS price $4.60

California Inst. of Tech., Pasadena.
ANALYSIS OF ECHOES FROM A HOLLOW METALLIC SPHERE IN WATER,
by Robert Hickling. Dec 63, 42p. Rept. no. 122 1
Contract N60530 9198
Unclassified report

Descriptors: (*Sonar targets, Spheres), Metals, Analysis, Underwater sound, Thickness, Iron, Aluminum, Water, Vacuum, Equations, Sonar signals, Sonar pulses, Sonar, Metals.

The nature of sonar echoes from a hollow metallic sphere in water is investigated theoretically in relation to the thickness of the shell and the contents of the hollow region. Steady state solutions are presented for iron and aluminum spheres filled with water, and for iron spheres with a vacuum inside. Calculated results for pulsed sound suggest that part of the echo originates from a type of flexural wave moving around the shell, which changes into a surface wave as the shell thickness increases. Significant differences in echo structure occur when the interior region is changed from water to a vacuum. (Author)

7. ELECTRICAL EQUIPMENT

AD-431 201 Div. 7, 25
OTS price $3.00

Sundstrand Aviation-Denver, Denver, Colo.
ANALYSIS AND FEASIBILITY STUDY OF THERMAL ENERGY STORAGE DEVICES FOR SPACE VEHICLE APPLICATIONS.
Rept. for Mar 60-Apr 63,
by R. N. Bailey, R. R. Conrad, L. S. Loseke, J. R. May and R. F. Taylor. Jan 64, 181p.
Contract AF33 616 6997, Proj. 3145, Task 314502
WADD TR61 118 Unclassified report

Descriptors: (*Electric power production, Solar radiation), (*Power supplies, Spacecraft), Seals (Stoppers), Synthetic rubber, Energy conversion, Electromechanical converters, Heat transfer, Enthalpy, Entropy, Emissivity, Lithium compounds, Hydrides, Dissociation, Hydrogen, Permeability, Stainless steel, Halocarbon plastics, Adsorption, Rubidium, Aromatic compounds, Fluorides, Potassium compounds, Sodium compounds, Potassium, Compatibility, Elastomers, Corrosion, Nickel alloys, Molybdenum alloys, Niobium alloys, Diphenyl.

This report summarizes several phases of experimental and analytical efforts directed toward determining the feasibility of thermal energy storage for orbiting solar space power systems. The stored energy is used for cycle heat input to a solar power system during shaded portions of the orbit path. Specific subjects of this report are: (1) Generalized determination of energy storage requirements for various dynamic power systems; (2) Experimental investigation of boiling heat transfer rates of a representative Rankine cycle working fluid with heat released from a fusion-type storage material; (3) Experimental determination of corrosion characteristics of various thermal energy storage materials with potential containment materials; and (4) An experimental and analytical study of a unique method using an electrical charge for reducing hydrogen diffusion rates through containment materials. (Author)

AD-431 557 Div. 7
OTS price $10.50

GM Defense Research Labs., Santa Barbara, Calif.
STUDY OF A THERMOPHOTOVOLTAIC CONVERTER.
Final rept., 1 Jan-31 Dec 63.
Feb 64, 139p. Rept. no. TR64 16
Contract DA36 039AMC02255E, Proj. 1G6 41209D534 10
Unclassified report

Descriptors: (*Photoelectric cells (Semiconductor), Materials), (*Photoelectric materials, Thermoelectricity), (*Solar radiation, Energy conversion), (*Thermoelectricity, Semiconductors), (*Energy conversion, Photoelectric cells (Semiconductor)), Portable (Man-portable). Thermal conductiviey, Germaniumb Silicon, Electric power production, Reflection, Impurities, Energy, High temperature research, Emissivity, Gold, Silicon compounds, Carbides, Antimony alloys, Gallium alloys, Indium alloys, Absorption, Electrical properties, Electric potential, Electric currents, Goniometers, Infrared radiation, Theory.

Components for a portable thermophotovoltaic energy converter have been investigated experimentally and theroretically. Using a newly designed reflectance goniometer, reflectance values were measured for specular front-surface gold-on-germanium (98.3%), for specular front-surface germanium and rear-surface germanium-gold combined (92.7%), and for a rougher scattering front-surface gold-on-germanium (97.4%). It appears that adequately transparent germanium cells can be made with a 4% long-wavelength transmission loss per round trip, with acceptable Fermi and doping levels. Neither gallium antimonide nor indium arsenide shows promise as an alternative to germanium. For burner mantle materials, SiC shows promise. The reflectance measurements on Cr-Co-Fe oxide-stained alumina indicate that the emissivity may be as high as 0.95; stained oxides may therefore also be suitable. Design studies for a burner with 30% stack loss were completed. (Author)

AD-431 593 Div. 7, 25
OTS price $8.10

MB Associates, San Ramon, Calif.
ANALYSIS AND TEST OF EXPLOSIVLEY DRIVEN MAGNETOHYDRODYNAMIC PULSE GENERATOR.
Final rept. June 63-Jan 64,
by T. Williamson, D. R. Sawle and Homer Bosserman. Feb 64, 87p. Rept. no. R63
Contract AF33 657 11562, Proj. 5237, Task 523701
AL TDR64 11 Unclassified report

Report on High Intensity Laser Technology.

Descriptors: (*Magnetohydrodynamics, Generators), (*Lasers, Electric power production), Feasibility studies, Explosive actuators, Electromagnetic pulses, Energy conversion, Xenon lamps, Design, Theory, Detonation waves, Magnetic fields, Switching circuits, Model tests, Armature, Coils, Test methods, Power supplies.

This program has successfully demonstrated that electrical power can be generated from high explosives by magnetohydrodynamic means. One and one tenth megawatts of power were generated and supplied to an FX-1 flash tube. The low efficiency of the units produced during this project does not make them practical as generators of electrical energy. Efficiency can be improved substantially by (1) employing larger generators, and (2) by designing the load to match the generator characteristics. (Author)

AD-431 610 Div. 7, 13
OTS price $2.75

Smith, A. O. Corp., Milwaukee, Wis.
NOVEL POWER SOURCES FOR SHELTERS.
by Francis W. Lauck and Vern D. Overbye. Mar 63, 147p.
Contract OCD OS62 243, Task 1411D
Unclassified report

Descriptors: (*Energy conversion, Sources). (*Power supplies, Shelters). (*Shelters, Power supplies). Thermionic converters, Fuel cells, Thermoelectricity, Magnetohydrodynamics, Solar cells, Piezoelectric effect, Turbines, Rotor blades (Turbomachinery). Gas turbines, Monopropellants, Nuclear reactors, Radioactive isotopes, Wood, Coal, Fuels, Fuel oil, Gasoline, Petroleum, Boilers, Heat transfer, Bibliographies, Thermionic emission, Fluids, Solids, Gases, Storage.

Contents: Prime Movers for Conventional Stand-by Power Systems; Newer Conversion Devices; Novel Conversion Devices; Fuels; Combustion Equipment; Heat Rejection Equipment.

AD-432 063 Div. 7, 20, 25
OTS price $8.10

Radio Corp. of America, Lancaster, Pa.
RESEARCH, DEVELOPMENT, AND EVALUATION PROGRAM TO DEMONSTRATE PERFORMANCE AND RELIABILITY OF

Division 7 - ELECTRICAL EQUIPMENT

THERMIONIC DIODE CONVERTERS FOR NAVAL NUCLEAR REACTORS.
Semi-annual rept., 26 June-31 Dec 63.
Feb 64, 85p.
Contract NObs88622, Proj. SR007 12 01
Unclassified report

Descriptors: (*Nuclear reactors, Thermionic converters), (*Thermionic converters, Nuclear reactors), Tests, Life expectancy, Reliability (Electronics), Failure (Mechanics), Stresses, Naval equipment, Manufacturing methods, Thermal stresses, Power supplies, Alternating current, Electrodes, Diodes, Performance (Engineering), Liquid cooled, Test equipment (Electronics), Processing, Heaters, Cesium, Reactor fuels.

Efforts were continued on a program to determine life and reliability of a thermionic energy converter designed for operation in a thermal reactor, and to refine the converter design to eliminate causes of failure. Design modifications to permit the inclusion of a fuel sleeve in the emitter of the A-1272 were made, and other modifications to improve converter performance were completed. High-stress and parametric tests were conducted. Detailed fabrication procedures were perfected. A system was established for recording all significant dimensions of converter components during fabrication; these data will be used to determine the extent of structural changes occuring throughout converter life. Twelve converters were tested for high-stress and performance limits, 4 were subjected to extensive life tests and one to preliminary life testing. The four converters, without nuclear fuel, have operated for a total of 1248 hours on life test without failure. The first fueled converter failed during initial tests as a result of a thermal short caused by the evaporation of fuel onto heater parts. (Author)

AD-432 155 Div. 7, 1
OTS price $14.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STUDY OF SPECIAL PURPOSE AIRCRAFT ELECTRICAL MACHINES (ISSLEDOVANIYE SPETSIAL'NYKH AVIATSIONNYKH ELEKTRICHESKIKH MASHIN).
12 Dec 63, 215p.
FTD TT63 117 Unclassified report

Trans. from Trudy Instituta no. 133, pp. 1-151, 1961.

Descriptors: (*Electric motors, Aircraft equipment), (*Generators, Aircraft equipment), Electrical properties, Design, Performance (Engineering), Electric equipment.

Contents: Determination of parameters of magnetoelectric generators with a star type rotor; The effect of aluminum filling of rotors of magnetoelectric generators on their efficiency; The effect of steady load and transients on the form of field and voltages of electromagnetic generators; Calculation of performance of electrical machines with screen effect; Qualitative analysis of synchronization of motor-converter with a source of standard frequency in the system of integral regulator for precision regulation of frequency; Experimental determination of mechanical characteristics of motors; The effect of rotor's material on the characteristic of a motor with solid rotor; Parametric motor of reciprocating motion; Magnetic field in the gap of the inductor machine with pulsating flux of rotor's tooth; Concerning the problem of theory of impulse voltage regulation at equivalent load.

AD-432 158 Div. 7
OTS price $4.60

Syracuse U., Research Inst., N. Y.
SENSITIVITY AND STABILITY IN ACTIVE NETWORK SYNTHESIS,
by Donald Melvin. 31 Jan 64, 47p. Rept. no. EE975 6401FR; EE975 6401SR2
Contract AF19 628 1649, Proj. 562801
AFCRL 64 47 Unclassified report

Descriptors: (*Electrical networks, Synthesis), Numerical analysis, Electrical impedance, Sensitivity, Stability, Topology, Circuits, Admittance, Polynomials.

AD-432 192 Div. 7
OTS price $5.60

Harshaw Chemical Co., Cleveland, Ohio.
INVESTIGATION OF THIN FILM CADMIUM SULFIDE SOLAR CELLS.
Quarterly technical progress rept. no. 1, 25 Nov 63-25 Feb 64,
by J. C. Schaefer, R. J. Humrick and R. F. Belt.
6 Mar 64, 55p.
Contract AF33 615 1248, Task 817301 32
Unclassified report

Descriptors: (*Solar cells, Films), (*Cadmium compounds, Sulfides), Vapor plating, Vacuum apparatus, Quartz, Tantalum, Silicon, Fluorides, Copper compounds, Calcium compounds, Titanium, Nickel alloys, Iron alloys, Electroplating, pH, Copper, Sulfur, Zirconium, Molybdenum, Tungsten, Heat treatment, Optical properties, Electroplating, Solutions.

The purpose of this program is to continue the research and development on large area, thin film flexible, light weight cadmium sulfide solar cells. Higher efficiency stable cells with a high power to weight ratio are goals of this program. Higher efficiency cells appear probable when the barrier is formed chemically. Cells have been fabricated for exposure to gamma radiation at NRL. New contacting techniques are being investigated for application on the one square foot and one-half square foot arrays. A rear wall thin film CdS photovoltaic cell can be produced. A considerable effort would be needed to perfect this into an efficient and usable item. Further work has been abandoned. The principal vacuum evaporation parameters of substrate temperature and surface perfection have been studied for CdS depositions. Thin films of CdS were prepared on Mo, Ta, Ti, Invar 36, quartz, Si and CaF2. Substrate temperatures ranged from 200 to 650 C. Ti shows excellent promise for reducing the total cell weight. Annealing, doping and chemical reactions were studied to increase output efficiencies of production cells. (Author)

AD-432 195 Div. 7
OTS price $6.60

Yardney Labs. Inc., New York.
DEVELOPMENT OF THE SEALED ZINC-SILVER OXIDE SECONDARY BATTERY SYSTEM.
Quarterly progress rept. no. 1, 1 July-30 Sep 63,
by Martin Sulkes and George A. Dalin. 30 Sep 63, 61p.
Contract DA36 039AMC02238E, Proj. 3A99 09 002
Unclassified report

Descriptors: (*Batteries and components, Storage batteries), (*Storage batteries, Zinc), (*Alkaline cells, Storage), Silver compounds, Oxides, Battery separators, Test equipment, Oxidation, Penetration, Silver,

Cellulosic plastics, Halocarbon plastics, Polyethylene plastics, Polyvinyl alcohol, Nylon, Electrolytes, Physical properties, Electrodes, Potassium compounds, Hydroxides.

An experimental program was prepared for the first year's work, which consists of Phase 1, the evaluation of standard sealed cells. Phase 2, the study of recombination reactions, and Phase 3, the study of cell components. Sixteen sealed Zn-AgO cells were built for Phase 1 and have completed formation cycles. Tests were run on sealed Zn-AgO cells to determine pressure increase during discharged stand. It was found that an externally shorted cell would develop 40-50 psig after 3 days stand at RT. Capacity maintenance and pressure buildup on charged stand at 160 F were determined and found to be within acceptable limits. Three sample materials were received and subjected to various evaluation tests to determine their suitability as separators. (Author)

AD-432 202 Div. 7, 12
OTS price $19.75

Sundstrand Aviation-Denver, Denver, Colo.
INVESTIGATION OF A 15-KW SOLAR DYNAMIC POWER SYSTEM FOR SPACE APPLICATION.
Interim summary rept., 1 Jun 60-1 Jun 62,
by K. E. Nichols. 1 Jun 62, 344p.
Contract AF33 616 7128, Proj. 3145, Task 30500
Unclassified report

Descriptors: (*Electric power production, Spaceborne), (*Energy conversion, Solar radiation), Solar furnaces, Space environmental conditions, Expanded plastics, Parabolic bodies, Reflection, Mirrors, Metal films, Aluminum, Errors, Alternating current, Motor generators, Heat exchangers, Rubidium, Heat engines, Liquid metals, Bearings.

The general design studies, detailed design efforts, conceptual experimental component fabrication, and development testing completed through the report period is summarized. During the report period the evaluation and generation of design technology predominated. Through system studies a full scale design was created consisting of an inflatable concentrator, a solar energy divider, a double cavity heat receiver-storage unit, a multi-stage turbo-alternator assembly running on rubidium lubricated hydrodynamic bearings, and a radial flow radiator-condenser. Feasibility studies and designs were completed for an orientation system which minimizes reaction forces fed back to an assumed vehicle. Studies were completed for the integration and erection of the space power system (SPS) with an assumed vehicle. First priority was given to proving feasible a large size solar concentrator. A design competition was staged between a folding rigid mirror and an inflatable type. During this competition, 10 foot diameter scale methods of each were built and tested. Several flux traps were designed and tested. The heat receiver-storage assembly remains the most critical element of the system. A small scale unit is being fabricated for future evaluation. (Author)

AD-432 239 Div. 7
OTS price $4.60

Allis-Chalmers Mfg., Co., Milwaukee, Wis.
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL.
Quarterly technical progress rept. no. 1,
1 Nov 63-31 Jan 64,
by W. Mitchell, Powell Joyner, J. C. Prestridge and T. Egan. 15 Feb 64, 49p.
Contract AF33 615 1185, Proj. 8173, Task 817303
Unclassified report

Descriptors: (*Fuel cells, Design), (*Hydrogen, Fuel cells), (*Oxygen, Fuel cells), Containers, Electrical equipment, Values, Pressure regulators, Transducers, Thermostats, Thermal control, Test methods.

The major portion of the work during this first quarterly reporting period was accomplished on the 50 watt static orbital fuel cell and included: preparation and submittal of a technical plan, package design, procurement of components, fabrication and assembly of a preliminary model and the first orbital configuration package performance and environmental testing of components and packages. Work on the 400 watt system was directed toward determination of the center-line approach design and preparation of a technical plan. (Author)

AD-432 261 Div. 7, 4
OTS price $1.60

Oregon State U., Corvallis.
THE MECHANISM OF THE DISCHARGE AND RECOVERY OF THE VANADIUM PENTOXIDE ELECTRODE,
by Naola V. Watson and Allen B. Scott. 5 Mar 64, 14p. Tech. rept. no. 1
Contract Nonr128608, Proj. NR010 01 02
Unclassified report

Report on Electrochemistry of Primary Oxide Electrodes.

Descriptors: (*Vanadium compounds, Electrodes), (*Electric discharges, Electrodes), (*Electrodes, Electric discharges), Oxides, Reduction (Chemistry), Electric potential, PH, Potassium compounds, Chlorides, Solutions, Electrolytic cells, Electrochemistry, Theory.

A study was made to determine if the mechanism of the discharge and recovery of the V205 electrode was analogous to that proposed by Coleman for the MnO2 electrode. The discharge and recovery of the V205 electrode, at moderate current densities and in solutions in the pH range from two to five, were found to resemble closely these processes in MnO2. The discharge consists of reduction of the V205 followed by the diffusion of the discharge product, presumably by the motion of protons and electrons, into the body of the solid. The recovery consists of the continued diffusion of the discharge product, without further reduction, which increases the activity of the vanadium pentoxide on the surface and hence increases the electrode potential. (Author)

AD-432 346 Div. 7, 4
OTS price $2.60

Calvin Coll., Grand Rapids, Mich.
SILVER MIGRATION AND TRANSPORT MECHANISM STUDIES IN SILVER OXIDE-ZINC BATTERIES.
Quarterly technical progress rept. no. 1,
1 Dec 63-1 Mar 64,
by T. P. Dirkse. 1 Mar 64, 24p.
Contract AF33 615 1236, Proj. 8173, Task 817304 16
Unclassified report

Descriptors: (*Batteries and components, Alkaline cells), (*Alkaline cells, Electrochemistry), Performance (Engineering), Electrodes, Silver, Zinc, Silver compounds, Oxides, Battery separators, Transport properties, Electrolytes, Potassium compounds, Hydroxides, Palladium, Effectiveness, Zinc compounds, Cadmium, Aluminum, Surface active substances.

A survey has been made of some of the factors that may affect the amount of silver lost by the electrode during the cycling of a silver-alkaline battery. Factors studied were: palladium addi-

tions to the silver electrode; presence of zinc oxide and other metallic compounds in the electrolyte; the presence of surfactants in the electrolyte. The nature of the silver deposit on a cellophane separator has also been investigated. Finally, the presence of colloidal matter in solutions of silver oxide in potassium hydroxide solutions has been observed. (Author)

AD-432 482 Div. 7, 27
OTS price $1.60

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
RESEARCH INVESTIGATION OF MAGNETIC AND ELECTRIC FORCES FOR ROTATING SHAFT SUSPENSION.
Quarterly technical progress rept., Dec 63-Feb 64,
by M. G. Foster. Mar 64, 20p. Rept. no. EMI3421 108 64U
Contract AF33 657 8352
Unclassified report

Descriptors: (*Shafts, Rotation), (*Magnetic fields), (*Electric fields), (*Suspension devices, Shafts), Resonance, Damping, Configuration, Electrical equipment, Design, Electronic equipment, Stability, Amplitude modulation.

AD-433 119 Div. 7
OTS price $2.60

Mallory, P. R. and Co., Indianapolis, Ind.
MERCURY CELL BATTERY INVESTIGATION.
Quarterly technical progress rept. no. 7, 16 Jun-15 Sep 63,
by R. E. Ralston. 15 Sep 63, 27p.
Contract AF33 657 7706, Proj. 8173, Task 817304 14
Unclassified report

Descriptors: (*Batteries and components, Alkaline cells), (*Alkaline cells, Electrodes), (*Electrodes, Alkaline cells), (*Storage batteries, Alkaline cells), Mercury alloys, Palladium alloys, Zinc, Anedes (Electrolytic cell), Cathodes (Electrolytic cell), Particle size, X-ray diffraction analysis, Distribution, Electeochemistry, Capacitance.

X-ray analyses of the Pd-Hg alloy positive electrode material show a complicated structure. A paste of the Pd-Hg alloy powder has been applied to supporting screens for successfully eliminating the positive electrode disintegration encountered during cycle testing. The evaluation of two negative electrodes simultaneously is a useful method for studying zinc electrode deterioration resulting from downward sloughing. Organic binders in small amounts (1%) have not been effective in minimizing this problem. Small button type cells constructed with the Pd-Hg electrode material have completed 2200 cycles on the simulated 90 minute orbit. Additional data have been accumulated to aid in designing an experimental battery. Inherent difficulties, such as frequency dependence and capacitance variable with time, limit the value of impedence bridge capacitance measuring methods to determine the true surface area. (Author)

AD-433 120 Div. 7
OTS price $3.60

Mallory, P. R. and Co., Indianapolis, Ind.
MERCURY CELL BATTERY INVESTIGATION.
Quarterly technical progress rept. no. 3, 16 June 15 Sep 62,
by J. M. Booe and R. E. Ralston. 15 Sep 62, 40p.
Contract AF33 657 7706 Task 817 304
Unclassified report

Descriptors: (*Batteries and components, Alkaline cells), (*Alkaline cells, Electrodes), (*Mercury alloys, Anodes (Electrolytic cell)), (*Storage batteries, Alkaline cells), Cathodes (Electrolytic cell), Palladium alloys, Battery separators, Resistance (Electrical), Electrolytes, Electric discharges, Polyvinyl chloride, Halocarbon plastics, Polyethylene plastics, Acrylonitrile polymers, Potassium compounds, Hydroxides, Zinc compounds, Oxides Tensile properties, Stability, Environmental tests, Battery compartments.

A plastic version of the exploratory research cell which will accommodate the compartmented liquid anode retainer was fabricated. This design was successfully used in discharge experiments with the negative electrode to study electrode spacings. An alternating current method of separator resistance measurement was evaluated. The characteristics of several membrane type separators after exposure to degrading environments are presented. The use of palladium in the positive electrode continued to show high efficiency with respect to charge acceptance. Porous forms of carbon were studied as possible expanders to control positive electrode densification. Automatic cycle test life of some experimental Test Vehicle #2 cells passed 1000 cycles. Preliminary specimens of the liquid anode retaining member for this larger test cell were produced. (Author)

AD-433 146 Div. 7, 4
OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
NEW CATHODE-ANODE COUPLES USING NONAQUEOUS ELECTROLYTE.
Quarterly technical progress rept. no. 3
by H. F. Bauman, J. E. Chilton and G. M. Cook.
15 July 63, 47p.
Contract AF33 616 7957, Proj. 8173, Task 817304 10
Unclassified report

Descriptors: (*Storage batteries, Electrochemistry), (*Batteries & components, Storage batteries), (*Electrodes, Storage batteries), Organic solvents, Alkanes, Nitrates, Battery separators, Lithium, Electrodeposition, Electrolytes, Silver compounds, Chlorides, Electrical conductance, Lithium compounds, Aluminum compounds, Polarization, Electric potential, Alkenes, Carbonates, Test equipment.

AD-433 225 Div. 7
OTS price $3.60

Union Carbide Consumer Products Co., Cleveland, Ohio.
ALKALINE-MnO2 BATTERY.
Quarterly rept. no. 6, 1 Aug-31 Oct 63,
by J. Winger. 6 Dec 63, 31p.
Contract DA36 039SC89098, Proj. 1G6 22001A053
Unclassified report

Descriptors: (*Batteries and components, Alkaline cells), (*Low-temperature batteries, Design), (*Alkaline cells, Low-temperature batteries), Battery separators, Manganese compounds, Dioxides, Cathodes (Electrolytic cell), Performance (Engineering), Resistance (Electrical), Mixtures, Steel , Nickel, Plating, Moisture, Containers.

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-431 233 Div. 8, 25
OTS price $3.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
REDUCTION OF ANISOTROPY FIELD OF THIN MAGNETIC FILMS BY ANNEALING,
by S. B. Greenberg. 20 Jan 64, 33p.
Task FR40306 6118A
NADC EL 6369 Unclassified report

Descriptors: (*Thin films (Storage devices), Heat treatment), (*Heat treatment, Magnetic fields), Anisotropy, Magnetic properties, Vapor plating, Temperature, Hysteresis, Processing.

The effects of post-deposition magnetic annealing on the magnetic properties of thin permalloy films were investigated. It was found that the largest decrease in anisotropy field was produced by annealing in a field along the transverse axis of a film. Anisotropy field values of 1.5 oersteds were obtained with little increase in angular dispersion. Values less than 1.0 oersted were obtained, but with a substantial increase in dispersion. Changes in magnetic properties produced by annealing were reversible at temperatures below 350 C. (Author)

AD-431 248 Div. 8
OTS price $5.60

Litton Industries, San Carlos, Calif.
RESEARCH ON NOISE IN CROSSED-FIELD GUNS.
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by R. P. Wadhwa. 20 Jan 64, 47p.
Contract NObsr89546
Unclassified report

Descriptors: (*Electron guns, Noise), Measurement, Design, Frequency, Resonance, Propagation, Magnetic fields, Electric fields, Cyclotron waves, Secondary emission, Cathodes, Electron beams, Transformers, Injectors, Space charges.

The sole coupling mechanism in an injected-beam crossed-field amplifier is discussed and some means to reduce this coupling are described. Sole coupling is one of the main criterion for establishing the stability of the device. Cold test measurements are described. The equations needed for noise figure calculations are derived and some results on the three waves excitation are given. Some further considerations in reducing the value of the diocotron gain are discussed, and application of these studies in reduction of the noise figure is discussed. Some initial work towards cyclotron wave interaction is discribed. (Author)

AD-431 250 Div. 8
OTS price $2.60

Electronic Defense Lab., Mountain View, Calif.
FORESHORTENED LOG PERIODIC DIPOLE ARRAY,
by Claes T. Elfving and Herbert Rosenthal.
12 Sep 63, 30p. Technical memo. no. M401
Contract DA36 039AMC00088E
Unclassified report

Descriptors: (*Dipole antennas, Antenna configurations), Inductance, Theory, Antenna radiation patterns, Electrical impedance, Broadband, Bandwidth, Models (Simulations), Performance (Engineering), Coils.

The development is described of a constant-width log periodic dipole array with inductively loaded radiating elements. A varying amount of inductive reactance is introduced to the equal-length elements, resulting in elements of varying electrical lengths for broad-band operation. While maintaining a constant element-spacing-to-electrical-length ratio and compensating for the increasing Q of the loaded elements by increasing the design ratio, good experimental results were obtained from antenna models with element foreshortenings up to two-to-one. An expression for the varying design ratio is developed, the approximate amount of inductive reactance necessary for a given amount of element foreshortening is shown, and performance data of an experimental model are given. (Author)

AD-431 255 Div. 8
OTS price $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
THE FABRICATION TECHNIQUE AND SPECTRAL CHARACTERISTICS OF A SPECIAL-PURPOSE ULTRAVIOLET PHOTODIODE.
by R. E. Rinehart. 14 Feb 64, 13p. Rept. no. GA4611
Contract AF29 601 6214, Proj. 372
Unclassified report

Descriptors: (*Photo tubes, Ultraviolet radiation), Photocathodes, Anodes, Nickel, Tantalum, Contamination, Cleaning, Diodes (Electron tubes), Zirconium, Sensitivity, Electrical properties.

In the course of the study of ablation phenomena, the need arose for a small, rugged photodiode which would respond only to ultraviolet light of wavelength less than 3050 A. A photodiode which met these requirements was developed and a number of the phototubes have been fabricated and used in ablation experiments. The report describes the development and fabrication of the photodiode and summarizes its spectral characteristics. (Author)

AD-431 260 Div. 8
OTS price $4.60

Sperry Gyroscope Co., Great Neck, N. Y.
SUPERPOWER MICROWAVE WINDOWS.
Quarterly progress rept. no. 3, 2 July-1 Oct 63,
by D. B. Churchill and A. S. Ferello. Oct 63,
50p. Rept. no. 16, NA8240 8345 3
Contract DA36 039AMC02161E, Task 1G6 2201A055 01 06
Unclassified report

Descriptors: (*Microwave equipment, Electron tube parts), (*Electron tube parts, Microwave equipment), Electric fields, Measurements, Reflection, Waveguide windows, Temperature, Power, Design, Broadband, Electron tubes, Frequency, Dielectrics, Materials.

Mechanical assembly problems necessitated design changes in windowtron D-1. Demountable models of the scaled window assemblies have been completed. The L-band prototype model has a nearly-flat transmission function with a 1.1 VSWR bandwidth of more than 40-percent. Windowtron A-4 was tested up to a peak power level of 8 megw without damage to the central sapphire-disc window. At this power level seal-edge arcing caused

the output window to implode. Temperature data taken before the implosion showed that the test window ran substantially cooler than either the sintered-alumina or lucalox discs tested earlier in the same windowtron structure. Windowtron B-2 was tested to destruction by high power operation. The first disc of the output window cracked at power levels of 31.5 megw peak and 12.6 kw average. Cracking was attributed to mechanical strains induced by the heat of multipactor discharge at the vacuum-side surface of the disc. There was no indication of breakdown on the pressurized side, and no evidence of puncture or erosion of the dielectric material. A detailed analysis of the circular electric-mode window test cavity showed that its gain in the absence of electronic loading was 264. (Author)

AD-431 270 Div. 8, 5, 6, 26
OTS price $8.60

Federal Electric Corp., Paramus, N. J.
A MAINTAINABILITY STUDY ON SHIPBOARD ELECTRONIC EQUIPMENT.
1 July 60, 100p.
Contract NObsr75376
Unclassified report

Descriptors: (*Maintainability, Electronic equipment), (*Electronic equipment, Maintainability), Feasibility studies, Measurement, Radar equipment, Radio equipment, Sonar equipment, Naval equipment, Shipborne, Numerical analysis, Mathematical prediction.

A maintainability study on shipboard electronic equipment and systems is described. The summarized results are presented of the program to determine the feasibility of describing the maintainability characteristics of fleet electronic equipment in numerical terms. The purpose of the study was to develop a practical method or procedure for maintainability measurement in advence of equipment production which would have reasonable correspondence with maintainability fleet measurements on equipments under typical operational conditions. The objective was approached through a study of representative equipments in three broad classes: radar, sonar and transmitter. The study concurrently conducted on each equipment included theoretical maintainability predictions and field observations to essentially test the validity of the prediction techniques. (Also see AD-431 269). (Author)

AD-431 289 Div. 8
OTS price $8.10

General Electric Co., Syracuse, N. Y.
AIR WEAPONS CONTROL SYSTEM 412L.
Quarterly reliability/maintainability program rept. no. 12.
31 Dec 63, 90p. Rept. no. AWCS SQR12
Contract AF19 628 571
Unclassified report

Descriptors: (*Air control centers, Data processing systems), (*Data processing systems, Reliability (Electronics)), Aircraft intercept control systems, Maintainability, Quality control, Production, Training, Management engineering, Electronic equipment, Scheduling, Measurements, Tests.

Contents: System Reliability/Maintainability -- System reliability analysis, Maintainability, Subcontractors, MTBF, MTTR, and availability figures, Reliability measurements, Training and education, and meetings; Equipment Reliability/Maintainability -- Component parts, Reliability measurements, and Production reliability.

AD-431 296 Div. 8
OTS price $8.10

Aerospace Corp., Los Angeles, Calif.
TRACKING, TELEMETRY, AND COMMAND STUDIES OF GROUND AND SATELLITE SUBSYSTEMS,
by E. M. Polzin. Dec 63, 85p. Rept. no. TDR269 4110 01 13, vol. 5
Contract AF04 695 269
SSD TDR63 334, vol. 5 Unclassified report

Descriptors: (*Antennas, Performance (Engineering)), Antenna configurations, Antenna feeds, Antenna lobes, Gain, Horn antennas, Lenses, Dielectric properties, Refractive index, Materials, Electromagnetic lenses, Lens antennas.

The basic ground station antenna types used in the field today are listed. The advantages, disadvantages, and characteristics of various antennas are listed for the convenience of system engineers, but no attempt has been made either to describe thoroughly why each antenna exhibits certain characteristics or to single out any type as being the best, since this is a function of specific system requirements and tradeoffs. Many references are presented from some of the common technical journals, which can be used if one wishes to pursue further a particular aspect. The study discusses reflector-type antennas, lens-type antennas, array-type antennas, and includes a short discussion of monopulse vs conical scan techniques. (Author)

AD-431 496 Div. 8
OTS price $6.60

Illinois U., Engineering Experiment Station, Urbana.
ON THE ANTENNA NOISE AND ITS MINIMIZATION,
by Y. T. Lo. Sep 63, 65p. Technical rept. no. 74
Contract AF33 657 10474, Proj. 6278, Task 627801
Unclassified report

Descriptors: (*Antennas, Noise (Radio)), (*Noise (Radio), Mathematical prediction), (*Mathematical prediction, Noise (Radio)), Power, Temperature, Signal-to-noise ratio, Sensitivity, Antenna configurations, Theory.

In this investigation a method of estimating various antenna noises is discussed. In the general case when noise sources are in the near field of the antenna the problem become exceedingly difficult. For this only a high frequency approximation is suggested; it is similar to the general scattering theory of perfectly conducting scatterers. For a given antenna and a given noise temperature distribution in space, an optimum aperture distribution, discrete or continuous, can be obtained by maximizing the signal to noise ratio with a reasonable value of the antenna Q-factor. The solution to this problem is reduced to that of an eigen-value of a matrix equation. As an example, the antenna noise temperature of the University of Illinois Radio Telescope is approximately determined by the method discussed in Section 2. (Author)

AD-431 542 Div. 8, 26
OTS price $3.60

Radio Corp. of America, Harrison, N. J.
A 10-Mw, X-BAND TUNNEL-DIODE OSCILLATOR.
Quarterly progress rept. no. 1, 1 July-30 Sep 63, by E. Diamond, E. Casterline, R. Gold and D. Nelson. 30 Sep 63, 26p.
Contract DA36 039AMC03195E. Proj. 3A99 21 002
Unclassified report

Descriptors: (*Microwave oscillators, X-band). (*X-band, Microwave oscillators). (*Tunnel diodes, Microwave oscillators). Gallium alloys, Arsenic alloys, Electric current, Tuning devices, Waveguides, Transmission lines, Production, Electrical properties, Power, Manufacturing methods, Performance (Engineering).

Several gallium-arsenide diodes having peak currents of 50 ma and cutoff frequencies of 15-17 Gc were tested in a low-inductance strip-line circuit. At frequencies between 6100 and 6700 mc/sec, rf output powers of 0.9 milliwatts were measured. Diodes are presently being fabricated with objective cutoff frequencies of 20 Gc and higher in order to raise the power level. A waveguide tunable oscillator circuit was designed and constructed. Tests of this circuit are awaiting the next lot of higher cutoff frequency diodes. (Author)

AD-431 543 Div. 8, 26
OTS price $4.60

Little, Arthur D., Inc, Cambridge, Mass.
METHODS FOR LOW POWER TEMPERATURE CONTROL.
Quarterly rept. no. 1, 1 May-31 July 63,
by Igor A. Black and John Peterson. 31 July 63, 42p.
Contract DA36 039AMC02207E, Task 1G6 22001A058 02
Unclassified report

Descriptors: (*Crystal ovens, Design), (*Temperature control, Crystal ovens). Quartz resonators, Thermostats, Power, Temperature, Thermal insulation, Vacuum apparatus, Crystal holders, Glass, Vacuum seals, Metals, Sheets, Welding, Manufacturing methods, Miniature electronic equipment.

An investigation is reported of methods, techniques, and devices by which the temperature of a quartz crystal can be maintained, with a minimum of power, at a nominal operating temperature over environmental temperature extremes. The work includes investigations of second-order effects applicable to the design of low-power crystal ovens. End products resulting from the study are three types of ovens: a 3 cubic in., 500 milliwatt oven (Type J6) requiring accessibility to the crystal and operating at +75 C ± 1 C over a -55 C to +60 C ambient; a 3 cubic in. reduced power, sealed oven (Type K6G) with similar operating requirements; a 4 cubic inch, 250 milliwatt oven (Type L6) requiring accessibility to a chamber capable of housing 2 crystals and operating at 0 C ± 1 C over a -55 C to 0 C ambient. Calculations show that a 1.5 cubic in. sealed oven with the present size core, insulated by 2 low-emissivity walls and with a high vacuum between the walls, would require a power input of approximately 150 milliwatts at an ambient of -55 C. (Author)

AD-431 545 Div. 8, 25
OTS price $3.00

Westinghouse Electric Corp., Elmira, N. Y.
SOLID STATE IMAGE INTENSIFIERS. PHASE II, DEVELOPMENT OF AN INTERNAL TRAINER OPTICAL SYSTEM IMAGE INTENSIFIERS.
Final rept.,
by Zoltan Szepesi and William A. Thornton.
Nov 63, 18p.
Contract N61339 562
NTDC 562 1 Unclassified report

Report on Project LIT.

Descriptors: (*Image intensifiers (Electronics), Solid state physics), Photoelectric materials, Electroluminesecnce, Manufacturing methods, Resolution, Glass, Electric wire, Electrodes, Sandwich construction, Gain, Brightness, Mosaics (Light-sensitive), Vapor plating, Sulfides, Cadmium compounds.

Efforts concerned the development of photoconductor-electroluminescent (PC-EL) type solid state image intensifier panels for the visible light band and the building of an optical train (bench) incorporating the intensifier panels and the necessary power supplies. Three different and new construction methods were developed in building the low resolution image intensifier panel: (1) Fotoform substrate construction; (2) grooved glass construction with electrodes; (3) sandwich construction. The sandwich construction, after the difficulties were solved, proved to be a superior solution because of its simplicity and inherent higher resolution. Image intensifier panels were built in sizes up to 6 in. x 6 in., with maximum standard luminous gains of 100-ft-L per ft-c, with maximum output brightness of 30 ft-L, and with resolution higher than 100 lines per inch. Regarding the high resolution image intensifier, a major effort was spent in developing an evaporated EL film, indispensable for this construction. Working image intensifiers in this construction were not built. (Author)

AD-431 546 Div. 8
OTS price $2.60

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES TO IMPROVE TRANSISTOR RELIABILITY.
Quarterly progress rept. no. 4, 1 Apr-30 June 63. 30 June 63, 27p. Rept. no. 03 63 30
Contract DA36 039sc 86730I9
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), (*Reliability (Electronics), Transistors), Production, Processing, Cleaning, Surface properties, Oxides, Welding, Silicon, Crystal growth, Ceramic materials, Chemical milling.

Efforts were continued on the establishment of a PEM to improve transistor reliability. The areas covered are: material preparation; thermal dissipation of package; assembly; cleaning techniques; final preparation prior to assembly; controlled formation of surface oxides; welding; post weld conditioning. (Author)

AD-431 579 Div. 8
OTS price $13.00

Raytheon Co., Burlington, Mass.
ENGINEERING AND PRODUCTIZATION OF AN INTEGRATED FAMILY OF BACKWARD WAVE OSCILLATORS.
Final rept., 7 July 61-7 Jan 63,
by Peter Janis and James Gallagher. Oct 63, 186p. Rept. no. PT675
Contract AF33 600 43395, Proj. 7 695A
ASD TDR63 7 695A Unclassified report

Report on M-Type BWO Program.

Descriptors: (*Backward-wave oscillators, Performance (Engineering)), Production, Electron tubes, Ultrahigh frequency, Superhigh frequency, Delay lines, Electron guns, Magnets, Waveguides, Vibration, Life expectancy, Tests, Environmental tests, Temperature, Shock (Mechanics), Manufacturing methods.

A family of electrically and mechanically compatible electronically tunable M-type backward-wave oscillators has been developed. The tubes of this series have been redesigned and production refined, and small quantities of each tube type have been fabricated and subjected to stringent electrical and environmental tests. Optimum tube designs have been achieved to meet the requirements of the new ASD coordinated exhibit. Cost reduction has been obtained through the use of many common parts and through the establishment of economical manufacturing methods. The tubes have been designed for processing on the mass-production in-line exhaust system. As a result of this program, Raytheon has developed production capability covering seven of the nine frequency bands outlined in the ASD coordinated exhibit. meanwhile, Ratheon's extensive experience in the development and transfer to mass production of backward-wave oscillators will permit rapid extension of this capability to the remaining two bands if the necessity arises. (Author)

AD-431 580 Div. 8
OTS price $8.10

Raytheon Co., Burlington, Mass.
ENGINEERING AND PRODUCTIZATION OF AN INTEGRATED FAMILY OF BACKWARD WAVE OSCILLATORS.
Final rept.
by Peter Janis and James Gallagher. Oct 63, 87p. Rept. no. PT675, vol 2,
Contract AF33 600 43395, ASD Proj. 7 695A
ASD TDR63 7 695, vol. 2, A Unclassified report

Descriptors: (*Backward wave oscillators, Specifications). Production, Processing, Test methods, Design, Backward wave tubes.

Contents: M-BWO design and test specifications; and Family process secifications.

AD-431 582 Div. 8, 5
OTS price $4.60

ITT Federal Labs., Palo Alto, Calif.
SUBSCRIBER ACTIVITY-MEASUREMENT OF SOME PERFORMANCE FACTORS OF VOCODERS.
Final rept.,
by C. W. Vaderson. 31 Oct 61, 50p.
Task C3061 0230
ESD TDR64 227 Unclassified report

Subcontractor to ITT Communication Systems, Inc., Paramus, N. J. Contract AF19 626 5

Descriptors: (*Voice communication systems, Performance (Engineering)), (*Speech recognition, Test methods), (*Sound reproduction systems, Speech recognition), Sampling, Magnetic recording systems, Noise, Sound pitch, Analysis of variance, Sound signals, Signal-to-noise ratio, Analysis, Tables.

The purpose of this task was to determine the degree of intelligibility and overall quality factors of certain speech processing devices. A magnetic tape catalog of speech samples from these devices was prepared for further reference. Additional speech processing equipment data such as size, weight, cost, etc., is summarized which may per pertinent for system design considerations. Input magnetic test tapes, containing speech with several background conditions, were run through the speech processing devices while in back-to-back operation. Samples from the ouput (processed) tapes were arranged into a suitable matrix design and administered to listeners to obtain intelligibility and quality scores. The determination of the intelligibility and overall quality factors of the investigated devices was accomplished in accordance with previously prepared performance standards and test specifications. The results of this investigation indicate that there are several speech processing devices that perform satisfactorily in back-to-back operation. (Author)

AD-431 614 Div. 8
OTS price $1.25

Melpar, Inc., Falls Church, Va.
MOLECULAR CIRCUIT DEVELOPMENT.
Final summary rept., 15 May 60-15 Nov 63,
by Charles W. Moulton. 15 Nov 63, 42p.
Contract NOw60 0362c
Unclassified report

Descriptors: (*Molecular electronics, Semiconductor devices), (*Semiconductor devices, Molecular electronics), (*Manufacturing methods, Molecular electronics), Electric fields, Transistors, Metal films, Semiconducting films, Silicon, Germanium, Gallium alloys, Arsenic alloys, Evaporation, Vacuum, Cadmium alloys, Tellurium alloys, Electrical properties, Boron, Stability, Dielectrics, Detectors, Limiters, Gates (Circuits), Rectifiers, Amplifiers, Oscillators.

This report summarizes the efforts undertaken in the developmental program on molecular circuits. Purpose of this project has been the performance of research and development into both materials and functions suitable for exploitation in molecular circuitry capable of operation at high temperatures. Work conducted under this contract has emphasized studies into high-temperature materials, passive and active devices, and thin-film circuitry. (Author)

AD-431 632 Div. 8
OTS price $2.60

Microwave Associates, Inc., Burlington, Mass.
BROADBAND MICROWAVE POWER LIMITERS.
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by Robert Tenenholtz. 31 Dec 63, 25p.
Contract NObsr89462, Proj. SR0080302, Task 9637
Unclassified report

Descriptors: (*Limiters, Microwave equipment). Design, Semiconductor devices, Diodes (Semiconductor), Performance (Engineering). Ceramic materials, Capacitance, Low-pass filters, Broadband.

A general procedure is presented which enables a design of limiters to be secured once overall specifications are known. Experimental results deal with performance achieved to date on low power prototype limiters for all three frequency ranges of concern. In addition, experimental data on broadband DC returns for the two lower frequency ranges is presented. (Author)

AD-431 638 Div. 8, 25
OTS price $3.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
RESEARCH AND DEVELOPMENT ON HIGH-POWER CRESTATRONS FOR THE 100-300 MC FREQUENCY RANGE.
Quarterly progress rept. no. 14, 1 Oct 63,-1 Jan 64,
by G. T. Konrad and C. K. Rhee. Jan 64, 36p.
Rept. no. 03783 15p
Contract NObsr81403, Proj. SF0100 201, Task 9294
Unclassified report

Descriptors: (*Electron guns, Design), Electrostatics, Very high frequency, Electron beams, Trajectories, Space charges, Radio-frequency, Performance (Engineering), Electrical properties, Electron tubes.

A series of trajectory plots is shown which led to a reasonably good electrial design for the P mu = 20 gun. The work done on the electro-statically focused tube using a P mu=4.46 gun indicates that much better focusing can be obtained with the improved gun. At reduced voltages the beam transmission is only fair but it is shown that the percentage of transmission is improving as the design voltage is approached. In order to center the operating band of the 100-watt Crestatrons more nearly within the desired frequency range and in order to overcome the r-f losses observed in the couplers, a revision is made in the tube design. The new dimensions and electrical parameters are shown. (Author)

AD-431 647 Div. 8
OTS price $5.60

Microwave Associates, Inc., Burlington, Mass.
KA-BAND CRYSTAL PROTECTOR.
Quarterly progress rept. no. 3, 15 Sep-15 Dec 63, by Paul Basken and Rodney J. Whitney. 15 Dec 63, 57p.
Contract DA36 039AMC00157E, Proj. DA1G6 22001A 055 04
Unclassified report

Descriptors: (*Transmit-receive tubes, K band), (*Limiters, Diodes (Semiconductor)), (*Varactor diodes, Limiters), Waveguide switches, Life expectancy, Tests, Waveguide windows, Glass, Waveguide irises, Bandwidth, Containers, Time.

The design of the four-element crystal protector, the two-element preTR, and efforts in the design of the solid-state varactor limiter were completed. In addition, the packaging of the preTR and crystal protector was completed. A series of life tests were conducted on the gas discharge devices, establishing the inadequacy of a single fill gas TR tube, and the merits of a dual fill combination. From these tests, the need of a gas reservoir was shown. In place of the limiter effort, which was terminated, the merits of an externally biased PIN switch will be investigated. Such a device, when added to the gas tube, is expected to substantially improve the crystal protection reliability. (Author)

AD-431 662 Div. 8
OTS price $3.60

Microwave Associates, Inc., Burlington, Mass.
X-BAND SOLID-STATE DETECTOR/AMPLIFIER.
Quarterly progress rept. no. 1, 1 July-30 Sep 63, by John J. Brule. 30 Sep 63, 32p.
Contract DA36 039AMC03274E, DA Proj. 3A99 21 003
Unclassified report

Descriptors: (*Microwave amplifiers, Negative resistance circuits), (*Demodulators, Microwave amplifiers), Tunnel diodes, Diodes (Semiconductor), Mixers (Electronic), X-band, Waveguides, Parametric amplifiers, Electrical impedance.

The major effort consisted of outlining the program, defining specific areas of investigation, assigning areas of responsibility and initiating the design study phase. Progress was made in the preliminary investigations of tunnel diode mixers, backward diodes, starved L. O. mixers and low noise transistors. A test mount that will be used for the measurement of backward diode characteristics has been constructed. The design of a strip transmission line balance mixer for the starved L. O. measurements has resulted in the successful completion of the waveguide to stripline transtion and preliminary tests of the R. F. choke section. In the area of tunnel diodes a breadboard model of a balanced mixer has been completed. (Author)

AD-431 725 Div. 8, 16
OTS price $1.60

R. F. Communications Inc., Rochester, N. Y.
DEVELOPMENT OF A MINIATURE TELEMETRY SYSTEM, by David A. Kavanagh. Nov 63, 12p.
Contract AF41 657 419, Task 775802
SAM B TDR63 80 Unclassified report

Descriptors: (*Telemetering transmitters, Tissues (Biology)), Animals, Body, Simulation, Solutions, Miniature electronic equipment, Very high frequency, Radiofrequency power, Pulse modulation, Materials, Batteries and components, Radiation effect, Electromagnetic waves.

Experiments with VHF miniature transmitters submerged in physiologic saline solution to simulate their being implanted in living animals indicate that internal telemetry from small animals may be feasible at frequencies as high as 200 mc. Further study is needed before conclusions can be drawn relative to the frequency range best suited for large animals. Tests with transmitters below 20 mc. held under a person's armpit indicate that the human body is essentially transparent to internal telemetry signals in that frequency range. Modulation schemes, power supplies, and encapsulants are discussed. (Author)

AD-431 731 Div. 8, 26
OTS price $7.60

Pacific Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE. TRANSISTOR, VHF, SILICON, POWER (25W-100MC).
Quarterly rept. no. 5,
by J. Crishal, J. W. Ewins and R. C. Neville.
30 Sep 63, 72p. Rept. no. 3000 4705
Contract DA36 039SC86733
Unclassified report

Descriptors: (*Transistors, Production), Manufacturing methods, Silicon, Power, Very high frequency, Diffusion, Boron compounds, Furnaces, Mechanical drawings, Coatings, Oxides, Impurities, Phosphorus, Electric currents.

Efforts continued on a production engineering measure for a VHF silicon power transistor. A proposed 25 Vdc design is shown to be superior to the 70 volt and 80 volt designs already in existance in terms of improved second breakdown resistance, while maintaining the same power gain frequency performance. The use of lower resistivity silicon and a lower bias voltage increases the current handling ability of the transistor while decreasing the amount of potential energy stored in the device, thereby increasing the resistance to second breakdown. Additionally, the lower bias voltage allows for improved operation in the field since military units will no longer need to carry voltage doublers. The price to be paid for such a design is shown to lie in terms of ability to handle the higher current. A page scheme featur-

ing reduced lead length is discussed. This new scheme features a 'third dimension' to allow for a wiring harness which is brazed over the wafer. The resultant short lead length is beneficial at high frequencies due to decreased lead impedance. (Author)

AD-431 733 Div. 8
OTS price $2.50

Sperry Microwave Elctronics Co., Clearwater, Fla.
CIRCULAR WAVEGUIDE DUPLEXERS AND CIRCULAR WAVEGUIDE MICROWAVE TRANSMISSION LINE,
by W. C. Heithaus. Jan 64, 115p.
Contract AF33 616 6517, Proj. 4156, Task 415602
RTD TDR63 4141 Unclassified report

Descriptors: (*Waveguides, Cylindrical bodies), Radar duplexers, Theory, Bibliographies, Attenuators, Phase shifters, X-band, Super high frequency, Waveguide couplers, Propagation, Ferrites, Polarization, Dielectrics, Waveguide circulators, Radiofrequency power, Absorption, Standing wave ratios, V-band, Bandwidth, Electric currents, Configuration, K-band.

A survey is presented of the current state of the art in circular waveguide theory and technique. Results of prior work which was studied are correlated and presented along with a bibliography of sources consulted in the survey. This report describes the development of duplexers, load-to-line isolators, adjustable attenuators, and controllable phase shifters to TE01 mode circular waveguide systems. Development problems are discussed and designs selected in overcoming these problems. These units were developed for each of two 6% frequency bands centered at 9.375 Gc (X band) and 35 Gc (K band). The K-band duplexers and isolators are designed around a zero-db coupler propagating the TE01 mode in a 0.752 inch ID primary circular waveguide, and TE10 mode in the secondary WR28 waveguide. Ferrites mounted in the secondary guide make coupling nonreciprocal. The X- and K-band phase shifters, the X-band isolators, and the X-band adjustable attenuators are built in cruciform waveguide with transitions from 0.725 inch ID or 2.710 inch ID circular guide at the input and output. Ferrites mounted in the cruciform waveguide encounter a circularly polarized microwave H-field permitting the ferrite to provide phase shift or nonreciprocal attenuation. (Author)

AD-431 749 Div. 8, 26
OTS price $5.60

Sylvania Electric Products, Inc., Walthan, Mass.
ACTIVE THIN FILM TECHNIQUES MICROMIN PROGRAM.
Interim development report no. 6, 1 Nov 63-31 Jan 64,
by Egons Rasmanis, James Cline and Robert Tiernan.
28 Feb 64, 60p.
Contract NObsr87633, Proj. SR008 03 03, Task 9631
Unclassified report

Descriptors: (*Semiconductor devices, Semiconducting films), (*Semiconducting films, Vapor plating), Processing, Diodes (Semiconductor), Fixed contacts, Dielectric films, Electric insulation, Silicon, Germanium, Microminiaturization (Electronics), Electron beams, Manufacturing methods, Scheduling, Vacuum, Hall effect, Equations, Crystal structures, Heat treatment, X-ray diffraction analysis.

An investigation was made for developing a process for depositing device-quality silicon and/or germanium films on glazed polycrystalline insulating substrates by vacuum evaporation of silicon and/or germanium and to form thin film diodes and transistors in these films. The silicon depositions were carried out for the control of n-type doping, Hall measurements, improvement of crystallinity by annealing and by electron beam heating, and fabrication of improved diodes and transistors. Diodes with ohmic contacts were made with reverse breakdowns of 15 to 60 volts. The apparatus for Hall and resistivity measurements was improved, resulting in reliable and reproducible data on mobilities and carrier concentrations. The patterns for the Hall resistivity silicon deposition mask and the photoresist mask were changed so that both resistivity and Hall measurements could be made in a single operation. Improved crystalline quality in silicon thin films has been obtained through high temperature annealing. Initial vacuum deposited films exhibited increased grain size and Laue spots. (Author)

AD-431 756 Div. 8
OTS price $3.60

Westinghouse Electric Corp., Washington, D. C.
500 WATT SILICON POWER TRANSISTOR.
Quarterly rept. no. 2, 31 Oct 63-30 Jan 64.
30 Jan 64,, 35p.
Contract NObsr91001, Proj. SR0080304, Task 9347
Unclassified report

Descriptors: (*Transistors, Silicon), (*Test methods, Transistors), Test equipment (Electronics), Heat transfer, Electric current, Electric potential, Transients, Power, Numerical analysis, Encapsulation, Electrical properties, Tests, Computers, Programming (Computers), Electrodes.

Efforts were continued on the development of 500-watt silicon power transistors. The studies pointed to two general areas in controlling secondary breakdown: (1) to provide control of thermal runaway and structural advantage for best heat transfer; and (2) to provide minimum probability of generating non-uniform current distribution and thereby hot spots. Two testing methods and equipment for each were completed and put into operation. These testers, in conjunction with the present power test method, cover both the transient and steady-state operation of a device. They now allow an adequate measure of the device capability. Device design calculations were made using both manual and computer methods. Initial checks on junction characteristics were made. Preliminary design of the encapsulation was made. The dimensions, however, are not scheduled to be finalized until the device design is completed. (Author)

AD-431 772 Div. 8, 26
OTS price $10.50

Microwave Associates, Inc., Burlington, Mass.
DEVELOPMENT OF A 300-900 MCS HIGH POWER TRAVELING-WAVE TUBE.
Final rept., June 62-Aug 63,
by Paul Singleton. Jan 64, 131p.
Contract AF33 657 9213, Proj. 4043, Task 404301
RTD TDR63 4213 Unclassified report

Descriptors: (*Traveling-wave tubes, Production), (*Ultrahigh frequency, Traveling-wave tubes), Bandwidth, Gain, Effectiveness, Power, Semiconductor devices, Electrical properties, Electron tube parts, Helixes, Electron beams, Physical properties, Cooling, Solenoids.

The development of a wide-band, high-power traveling-wave tube is described. The tube

has the following features: (1) three to one frequency bandwidth, (2) mimimum efficiency of 30 percent, (3) minimum saturated gain of 25 db, (4) single stage depressed collector, and (5) one kilowatt (CW) minimum power output. The development program is discussed, touching on both successes and problems during the experimental program. Design and electrical results are presented in graphical form and include depressed collector operation, gain versus frequency, and power output and efficiency versus frequency. Some important conclusions regarding high efficiency, wide-band operation are discussed, particularly with regard to efficiencies above 40 percent. (Author)

AD-431 779 Div. 8
OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE APERTURE EFFICIENCY OF SOME HORN-FED PARABOLOIDAL REFLECTORS,
by A. Dion. 30 Dec 63, 22p. Group rept. no. 61G3
Contract AF19 628 500
ESD TDR63 667 Unclassified report

Descriptors: (*Parabolic antennas, Effectiveness), Antenna feeds, Horn antennas, Antenna radiation patterns, Gain, Numerical analysis.

The optimum aperture efficiency of a reflector antenna is calculated for the cases where it is fed by one of three horn feeds of common occurrence. The effects, on the aperture efficiency, of varying the radiation characteristics of these feeds are also determined. (Author)

AD-431 821 Div. 8, 30
OTS price $10.50

Systems Research Labs., Inc., Dayton, Ohio.
INVESTIGATION OF SECONDARY PHENOMENA FOR USE IN CHECKOUT,
by Gilbert S. H. Hwang. Jan 64, 136p. Rept. no. 491 TDR1
Contract AF33 657 9913, Proj. 8119, Task 811925
APL TDR64 4 Unclassified report

Descriptors: (*Electronic equipment, Test methods), (*Circuits, Test methods), X-ray absorption analysis, Infrared radiation, Magnetic fields, Electric fields, Thermistors, Fluorescence, Radiofrequency spectroscopy, Emissivity, Infrared detectors, Infrared phenomena, Magnetic properties, Test equipment, Test equipment (Electronics), Thermionic emission, Thermal radiation, Electrostatic fields, Bibliographies, Physical properties.

This report discusses the experimental work, results, and conclusions of the investigation of secondary phenomena for use in checkout of electronic components and circuitry. It consists of a literature survey of the various secondary phenomena generated by operating electronic circuits and the methods of sensing them without direct electrical contact with these circuits. The investigation of physical laws and phenomena, from which suitable subjects for further consideration were selected, was also part of this program. The literature survey was of little assistance in the program as only a limited amount of work had been previously attempted on the effects of secondary phenomena. Different detection techniques of various secondary phenomena were tested experimentally: these were x-ray absorption, infrared using a thermistor, infrared using fluorescence, radio-frequency emission, magnetic fields, and electric fields. At present the x-ray absorption, infrared and radio frequency emission show the most promise for future consideration, although these systems will require additional time and effort to develop the techniques and necessary instrumentation. (Author)

AD-431 822 Div. 8, 25
OTS price $2.60

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
SOLID-STATE PANEL DISPLAY.
Technical rept., 1 Jun-30 Nov 63,
by Stephen Yando. Dec 63, 24p. Rept. no. TR63 209 7
Contract AF33 657 11371, Proj. 4335, Task 433521
RTD TDR63 4294 Unclassified report

Descriptors: (*Display systems, Piezoelectric crystals), (*Electroluminescence, Display systems), (*Ceramic materials, Piezoelectric crystals), (*Piezoelectric crystals, Electroluminescence), Brightness, Resistors, Effectiveness, Resolution, Scanning, Amplifiers, Circuits, Ferroelectric crystals, Semiconductor devices, Transducers.

Three developments for improved brightness and contrast will be incorporporated in an experimental model of a random-access solid-state panel display based on the use of a piezoelectric ceramic sheet in which elastic waves control the point-by-point excitation of an electroluminescent phosphor layer on the ceramic sheet. These developments are a multiple-electrode input transducer design which imparts a higher voltage to the piezoelectric sheet, a nonlinear resistor layer which suppresses unwanted excitation and a coupling film which permits the use of the nonlinear resistor layer without affecting elastic-wave propagation in the ceramic sheet. A new ferroelectric amplifier has been devised that promises piezoelectric-electroluminescent displays of still higher brightness, resolution and efficiency. A description of the circuit and its initial performance is given. The development of techniques for forming arrays of the circuit elements has begun. (Author)

AD-431 828 Div. 8
OTS price $3.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
A MICROWAVE CERAMIC TRIODE AMPLIFIER,
by J. R. Kay. 34p.
Proj. 1R242103D225
AMC RA RE TR63 32 Unclassified report

Descriptors: (*Microwave amplifiers, Triodes (Electron tubes)), Microwave frequency, Noise (Radar), Broadband, Electric potential, Impedance matching, Performance (Engineering), Radiation damage, tests, Test methods, Gain, Bandwidth.

The development and design of a broadband, low-noise microwave amplifier using ceramic triodes is presented. After the feasibility of ceramic triodes in microwave amplifiers was proven by initial experiments with single-stage and two-stage amplifiers, a four-stage broadband amplifier with approximately 33 db gain was designed. Experiments were made using the General Electric Z-2869 and 7768 ceramic triodes; the Z-2869 gave better results and was used in the final four-stage amplifier. Bandwidth was measured at the 1 db points. Noise figure was 11.5 db or better

across the band and maximum gain variation across the band was 0.7 db. No phase measurements were taken; however, phase characteristics of this amplifier are being investigated in conjunction with another project. (Author)

AD-431 870 Div. 8, 5
OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
DIVERSITY RECEPTION OF NONFADING FREQUENCY SHIFT KEYING,
by Jack K. Wolf. Jan 64, 23p.
Proj. 4519, Task 451903
RADC TDR63 475 Unclassified report

Descriptors: (*Diversity reception, Frequency modulation), Frequency shift keyers, Digital systems, Pulse communication systems, Communication theory, Demodulation, Radiofrequency interference, Integral equations, Matched filters.

The theoretical performance of a frequency diversity system used in conjunction with a nonfading communications channel is considered. Both a noncoherent receiver system and a coherent receiver system are considered. The performances of these systems are compared for both man-made and natural interference. (Author)

AD-431 892 Div. 8
OTS price $2.60

Martin Marietta Corp., Baltimore, Md.
INTERFERENCE REDUCTION TECHNIQUES FOR NONLINEAR DEVICES.
Quarterly progress rept. no. 3, 1 Oct-31 Dec 63, by W. M. Rice and D. Lee. Mar 64, 24p. Rept. no. ER13171 2
Contract DA36 039AMC02200E, Task IG20501D44 01
Unclassified report

Descriptors: (*Radiofrequency interference, Mathematical models), (*Mathematical models, Radiofrequency interference), Feasibility studies, High frequency, Very high frequency, Miners (Electronic), Modulators, Reduction, Nonlinear systems, Harmonic analysis, Sensitivity, Distortion.

Efforts were continued on a feasibility study and investigation of interference reduction techniques applicable to nonlinear devices. The work is divided into two phases: Phase I consists of the establishment of proper mathematical models that will be generally applicable to mixers and modulators in the 3-Mc to 100-Mc region, and Phase II consists of the use of these general mathematical models to find the optimum transfer characteristics for an idealized signal output. The nonlinearities that are determined from specifying a continuous band of harmonics were investigated. Representative characteristics for one-port and two-port devices were determined. Their behavior when subject to static changes in signal parameters was calculated. The problems of the sensitivity of the output to variations of input signals and the distortion that would be introduced by such a device were considered. Possible techniques to improve the device characteristics with respect to distortion and sensitivity are suggested. One such technique was investigated. (Author)

AD-431 898 Div. 8
OTS price $3.60

Linde Co., Div. of Union Carbide Corp., Cleveland, Ohio.
ELECTROLYTIC NIOBIUM AND NIOBIUM ALLOY CAPACITORS OF WET AND SOLID TYPES.
Final quarterly progress rept. no. 6, 1 Oct-31 Dec 63,
by F. E. Cariou. Jan 64, 35p.
Contract NObsr87478, Proj SR0080302
Unclassified report

Descriptors: (*Electrolytic capacitors, Niobium), Electrical properties, Temperature, Environmental tests, Manufacturing methods, Metal films, Dielectric films, Anodes.

Efforts were directed to determine the best processing methods for the preparation of niobium porous anode solid electrolyte capacitors up to the canning stage. Parameters to be studied in this phase include optiumum particle shape and size distribution, green density of anodes, sintering conditions, chemical etching and reformation-impregnation conditions. (Author)

AD-431 962 Div. 8
OTS price $5.60

Kuthe Labs. Inc., Newark, N. J.
PRODUCTION ENGINEERING MEASURE FOR A PHASE II SUPER POWER HYDROGEN THYRATRON TUBE.
Quarterly progress rept., no. 6, 7 June-Sep 63, by H. E. Krefft. 51p.
Contract DA36 039sc85985
Unclassified report

Descriptors: (*Thyratrons, Hydrogen), Ceramic materials, Air cooled, Life expectancy, Electron tube parts, Manufacturing methods, Modes (Electron tubes), Electrical properties, Saturate reactors, Steel, Aluminum.

During the sixth quarter period, one Phase II tube, type 8301/KU-275 serial No. 9 was made and shipped to the Electronics Research and Development Laboratories at Fort Monmouth, New Jersey as Contract Item 1-1-1, as Engineering Sample. It wast not operated or tested at the specified power level as the Phase II test set was still under construction. In spite of this limitation, three more tubes designed for cooling with air were built and processed. They were made under a company sponsored program which is aimed at fields of application which do not require cooling by water, and they are included in this report as they are otherwise identical with Phase II TUBES. Life tests in SLAC modulators at Stanford with two tubes of this type produced earlier were continued with satisfactory results as one of these tubes completed approximately 1700 hours of operating time at the end of the period covered by this report. (Author)

AD-431 964 Div. 8, 25
OTS price $5.60

Microwave Devices Lab., U. of Utah, Salt Lake City.
(No title).
Consolidated quarterly rept., 1 July-30 Sep 63. 30 Sep 63, 53p. TR Q6
Contracts Nonr128805, AF04 647 745
Unclassified report

Descriptors: (*Microwave equipment, Design), Electron beams, Lasers, Gases, Materials, Circuits, Dielectric properties. Oscillators, Mil-

limeterwaves, Plasma physics, Exhaust gases, Solid state physics, Thermionic emission, Superconductivity.

The broad purpose of this research activity is to extend the useful frequency spectrum into the range from microwave frequencies to optical frequencies and to improve existing devices and techniques in the microwave spectrum. At present this objective is being pursued by studies of of electron beam devices, solid state devices, and plasmas. (Author)

AD-431 966 Div. 8
OTS price $5.60

Microwave Associates, Inc., Burlington, Mass.
C- AND Ku-BAND SEMICONDUCTOR TR DEVICES.
Quarterly progress rept. no. 1, 1 July-30 Sep 63, by R. H. Brunton. 30 Sep 63, 51p.
Contract DA36 039AMC03187E, Task 1G622001A056
Unclassified report

Descriptors: (*Transmitter receivers, Semiconductor devices), (*Semiconductor devices, Transmitter receivers), C band, K band, Diodes (Semiconductor), Limiters, Switching circuits, Power, Varactor diodes, Production, Electrical properties, Integrated circuits.

The first sections of the report are devoted to a discussion of the basic diode limiter concept, limiter diode characteristics and diode packaging considerations. A following section is devoted to the C-band TR concept which has been determined through preliminary investigation. In addition the diode package and a single stage C-band limiter is described. The last two sections of the report are concerned with the technical accomplishments in the Ku-band work. Several ridge wave-guide test sections have been designed and measured. Data is given for PIN diodes in these test sections with a dc bias switching mode of operation. Other Ku-band diode limiter circuits have been designed and are described in the final section of the report. (Author)

AD-431 978 Div. 8
OTS price $3.60

General Time Corp., Stamford, Connecticut.
AN ELECTROMECHANICAL STEPPER.
Interim engineering rept. 8 Dec 63-7 Mar 64. 7 Mar 64, 33p.
Contract Nobsr89384, Proj. SR0080302, Task 9366
Unclassified report

Descriptors: (*Actuators, Rotary switches), (*Rotary switches, Solenoids), Remote control systems, Tests, Electric potential, Torque, Environmental tests, Electric currents.

Efforts were continued on the development of an electromechanical stepper suitable to remotely actuate electromechanical devices i. e.; rotary selector switch assemblies. Methods and equipment employed and results obtained from various tests are discussed. (Author)

AD-432 047 Div. 8
OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE DOUBLE-HELIX ANTENNA AND ITS VARIANTS: A NEW CLASS OF TUNABLE ENDFIRE ANTENNAS,
by H. W. Ehrenspeck. Dec 63, 14p.
Proj. 4600
AFCRL 63 588 Unclassified report

Descriptors: (*Helical antennas, Tuning devices), Antenna configurations, Gain, Bandwidth, Broadband, Phase control devices, Frequency, Antenna radiation patterns, Dielectric properties, Models (Simulation), Helixes.

Endfire antennas develop their maximum gain when the phase velocity of the surface wave traveling along the structure is adjusted to its optimum value determined as a function of antenna length and operating frequency. These antennas usually have a relatively small pattern bandwidth and, if maximum gain is desired, can be used over only a small frequency range. The antennas described in this paper inaugurate a new class of antennas that are tunable for maximum gain in the endfire direction over a wide frequency range; tuning is accomplished by changing the phase velocity continuously or in prescribed steps. Such antennas include certain spatial configurations of the double helix (a novel type of endfire antenna) and its artificical and natural dielectric variants. Useful structures are obtained through parallel displacement of two juxtaposed elements or angular displacement of a scissors arrangement. Model measurements show that maximum gain can be obtained over a frequency range of more than 2:1. Tuning effects are illustrated in detail by means of nearfield plots of a tuned dielectric antenna. (Author)

AD-431 993 Div. 8, 26
OTS price $4.60

Sylvania Electric Products Inc., Woburn, Mass.
DEVELOPMENT OF EPITAXIAL TECHNOLOGY FOR MICROELECTRONICS AND LARGE AREA DEVICE APPLICATION.
Quarterly rept. no. 7, 1 Nov 63-31 Jan 64, by P. Wang, B. Selikson, V. Sils, R. Berkstresser and ed. by J. Defandorf. 1 June 61, 42p.
Contract NObsr85431, Proj. SR0080302ST9348
Unclassified report

Descriptors: (*Epitaxial growth, Silicon), (*Manufacturing methods, Semiconducting films), (*Semiconducting films, Manufacturing methods), Electrical properties, Glass, Vapor plating, Evaporation, Mechanical properties, Integrated circuits, Diodes (Semiconductor), Boron, Production.

The study of epitaxial layer thickness and resistivity for integrated circuit N/P material was completed. Work on epitaxial layer perfection was continued and the importance of the substrate perfection and surface cleaning established. The feasibility of three point probe and junction capacitance techniques on a step-etched sample for the determination of layer doping profile was investigated. Experiments on in situ CO2 - SiCl4 oxide growth immediately after epitaxial deposition were started. Epitaxial deposition on peripheral oxide-masked substrates was investigated. The Sylvania double-bevel technique was successfully used to determine doping profiles in N+ prediffused N/P planar circuit structures. Work on vapor phase deposition of thin silicon films on non-silicon dielectric substrates was continued. (Author)

AD-432 027 Div. 8
OTS price $2.60

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
STUDY OF FAILURE MECHANISMS IN HIGH-POWER RADIO FREQUENCY GENERATING DEVICES.
Quarterly rept. no. 2, 30 Jul-29 Oct 63,

by M. Friedman Axler and R. A. Hein. Feb 64, 26p.
Contract AF30 602 3018, Proj. 5519, Task 551902
RADC TDR63 545 Unclassified report

Descriptors: (*Radiofrequency generators, Failure (Mechanics)), (*Failure (Mechanics), Radiofrequency generators), (*Traveling wave tubes, Failure (Mechanics)), Live expectancy, Oxide cathodes, Cathodes (Electron tubes), Gases, Adsorption, Electron tube parts, Mass spectroscopy, Coatings, Pressure.

The aim of this investigation is to determine failure mechanisms caused by residual gases in traveling-wave tubes and to study means of eliminating these gases in order to improve tube reliability. Gas spectra and electrical test data are shown for one tube operating at a severe life-test condition; correlation is made with tubes operating under a lower duty cycle. Gas ambient and gas sorption phenomena for tube components under operating conditions are presented for uncoated-cathode subassemblies and an oxide-coated cathode subassembly. In these subassemblies, the heater filament is the major gas source. (Author)

AD-432 055 Div. 8
OTS price $1.60

Vacuum Tube Products Div., Hughes Aircraft Co., Oceanside, Calif.
RESEARCH AND DEVELOPMENT OF TWO-COLOR DIRECT VIEW STORAGE TUBE WITH SELECTIVE ERASURE.
Interim development rept., 1 Oct 63-1 Jan 64, by P. P. Damon. Jan 64, 18p.
Contract NObsr89452, Proj. SR00 80301, Task 9459
Unclassified report

Descriptors: (*Storage tubes, Colors), Monochromatic light, Silicates, Sulfides, Phosphorescent materials, Electron guns, Electron tube parts, Brightness, Display systems, Secondary emission, Electric potential, Manufacturing methods, Phosphates, Electron bombardment, Electron optics.

A direct view storage tube is being developed which is capable of displaying stored information in either of two colors or in intermediate hues, and selectively erasing that information. The operating principle is based on the fact that flood electrons which pass through holes in the storage mask when the storage-surface potential is near cutoff, fall within small areas on the viewing screen opposite the storage mask holes; whereas flood electrons which pass through the holes when the potential is near its maximum, (i.e., flood gun cathode potential), fall on larger overlapping areas of the viewing screen. The viewing screen consists of two phosphors. One occupies small areas in register with the storage-mask holes, while the other occupies areas surrounding the first. (Author)

AD-432 056 Div. 8, 26
OTS price $3.60

Texas Instruments Inc., Dallas.
DEVELOPMENT OF A TRANSISTOR DELIVERING AN OSCILLATOR OUTPUT OF 250 MILLIWATTS AT 1.5 GIGACYCLES.
Quarterly progress report no. 2, 19 Sep-19 Dec 63.
25 Feb 64, 30p. Rept. no. 03 64 11
Contract NObsr89423, Proj. SR0080304, Task 9347
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hqs.

Descriptors: (*Oscillators, Transistors), (*Transistors, Production), (*Production, Manufacturing methods), (*Manufacturing methods, Transistors), Electrical properties, Electric current, Power, Configuration, Silicon compounds, Oxides, Gold, Bonding, Encapsulation, Performance (Engineering).

Studies were conducted to obtain a better understanding of the theory of operation of power oscillators. A normalized power output curve versus normalized frequency for single and dual element devices was developed. The reasons for minor modifications in pattern geometry are discussed. A detailed fabrication procedure for ther germanium planar devices is presented. The results of parametric and functional measurements on assembled devices are presented. The final coaxial header design, conclusions based on second quarter activities, and the proposed third quarter activities conclude the report. (Author)

AD-432 059 Div. 8, 12
OTS price $1.60

Sylvania Electric Products Inc., Waltham, Mass.
POWER SUPPLY PROTECTIVE CIRCUITRY.
12 Feb 64, 14p. Rept. no. CAP1PS
Unclassified report

Descriptors: (*Power supplies, Reliability (Electronics), Monitors, Voltage regulators, Avalanche diodes, Electric switches, Guided missiles (Surface-to-surface).

A recommendation a corrective action plan was made as a solution to the high cost of common and protective circuitry in terms, of reliability of the power supply types A, B, C, D and E in the Minuteman system. (Author)

AD-432 068 Div. 8, 18
OTS price $11.50

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE EQUIPMENT MAINTENANCE AND LOGISTICS PROGRAM. LOGISTICS AND MAINTENANCE SUPPORT SYSTEM PLANNING. VOLUME I.
Final rept., 1 Apr-30 June 62.
30 June 62, 154p.
Contract DA36 039sc85980
Unclassified report

Descriptors: (*Logistics, Design), (*Maintenance, Modules (Electronics)), (*Modules (Electronics), Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Modules (Electronics)), (*Design, Maintenance), Military requirements, Mathematical models, Reliability (Electronics), Failure (Mechanics), Transportation, Computers, Programming (Computers), Analysis, Personnel, Electrical equipment, Measuring devices (Electrical & electronic), Time, Data, Data processing systems, Maintenance personnel.

This report consists of five volumes, specifically oriented to convey the results of this program in conjunction with providing a tool of immediate applicability to logistic problems. The breakout of the program results also coincides with the manner in which the results would be applied, while also providing a basic ground structure upon which improvements of methodology and additional engineering knowledge may be added without requiring revamping of the present study results.

Volume I contents follow. Logistic and Maintenance Support System Planning: This volume contains the description of the program. The general procedures for utilizing the program results. The applicability and limitations of the program results. Recommended further work. (Author)

AD-432 069 Div. 8
OTS price $19.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ANALYSIS AND SYNTHESIS OF AMPLIFIER CIRCUITS (Analiz i Raschet Usilitel'nykh Skhem),
by L. Ya. Nagornyy. 10 Feb 64, 316p.
FTD TT63 1011 Unclassified report

Trans. from Gosudarstvennoye Izdatel'stvo Technicheskoy Literatury, Kiyev, pp. 1-244, 1963.

Descriptors: (*Amplifiers, Circuits), (*Circuits, Analysis), (*Analysis, Circuits), Classification, Electron tubes, Transistors, Specifications, Stability, Feedback amplifiers, Linear systems, Mathematical analysis, Synthesis, Reviews.

The development of a general method of analysis and synthesis of electron-tube and transistor circuits operating in the linear range are presented. The method is based on the generalized methods of node potentials and loop currents and makes it relatively easy to determine expressions for the basic parameters of the amplifier, to determine their relative change with variation of several parameters of the circuit elements, to investigate the final expression of the basic characteristics of the amplifier depending on variation of any parameter of the elements of the circuit for the case where all of them are complex numbers, etc. The basic calculating formulas expressed in terms of the determinant of the circuit matrix and its cofactor are presented in tables which to a significant degree facilitate their use in the analysis and synthesis of amplifiers. The book is intended for radio engineers and is also of interest to scientific workers dealing with the development and application of methods of electronic circuit analysis. (Author)

AD-432 081 Div. 8
OTS price $13.50

Philco Corp., Blue Bell, Pa.
ADVANCED ANTENNA TECHNIQUES.
Scientific rept. no. 1, 1 Dec 62-30 Sep 63,
by Leo W. Procopio, Thomas K. Kashihara, Stephen Czorpita, Kenneth Abend and Terrence A. Lenahan.
Oct 63, 198p.
Contract AF19 628 2403, Proj. 4600
AFCRL 63 539 Unclassified report

Descriptors: (*Antenna configurations, Resolution), (*Resolution, Linear systems), (*Linear systems, Antenna configurations), Antenna radiation patterns, Synthesis, Theory, Mathematical analysis, Fourier analysis, Time, Frequency, Coding, Gain, Bandwidth.

A generalized theory of resolution for linear array antennas is presented. The theory indicates that angular resolution is determined by the width of the autocorrelation of the field pattern and not by the width of the pattern itself. Hence, a well-defined main beam is not a prerequisite for achieving angular resolution; even noiselike beams can be characterized by an autocorrelation function of narrow width. It is shown that this basic principle leads to the concept of angular dispersion and compression, a phenomenon for angular beam patterns akin to dispersion and compression of radar pulses. A new procedure for synthesizing antennas for given resolution properties is also presented. The theory is applied to antennas with time-invariant and time-varying illumination functions, and is used to reexamine classical theories of superdirectivity. Antennas which intimately link resolution properties in range and angle are also analyzed; arrays in which each radiator operates at a different frequency are shown to be an example of this class. In addition to an exposition of angular resolutions theory, preliminary concepts for achieving angular dispersion and compression, and superdirectivity are also presented. (Author)

AD-432 082 Div. 8, 18
OTS price $9.60

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE EQUIPMENT MAINTENANCE AND LOGISTICS PROGRAM. LOGISTICS AND MAINTENANCE SUPPORT SYSTEM DESIGN. VOLUME II.
Final rept., 1 Apr-30 June 62.
30 June 62, 118p.
Contract DA36 039sc85980
Unclassified report

Descriptors: (*Logistics, Mathematical prediction), (*Maintenance, Modules (Electronics)), (*Modules (Electronics), Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Modules (Electronics)), (*Mathematical prediction, Maintenance), Military requirements, Data, Data processing systems, Data storage systems, Costs, Programming (Computers), Reliability (Electronics), Failure (Mechanics), Personnel, Training, Documentation, Tables, Electrical equipment, Procurement, Processing, Transportation, Maintenance personnel.

This volume contains detailed procedures for collecting, documenting, and processing necessary design and logistic parameter information. Its intent is to identify, quantify and present forms and procedures for documenting required design maintenance and logistic parameter information. (Author)

AD-432 083 Div. 8, 18
OTS price $10.10

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE EQUIPMENT MAINTENANCE AND LOGISTICS PROGRAM. PREDICTION OF LOGISTICS AND MAINTENANCE DEMAND PARAMETERS. VOLUME III.
Final rept., 1 Apr-30 June 62.
30 June 62, 127p.
Contract DA36 039sc85980
Unclassified report

Descriptors: (*Logistics, Management engineering), (*Maintenance, Modules (Electronics)), (*Modules (Electronics), Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Modules (Electronics)), (*Management engineering, Maintenance), Military requirements, Reliability (Electronics), Failure (Mechanics), Maintenance personnel, Time, Electronic equipment, Electrical equipment, Analysis, Measuring devices (Electrical & electronic), Personnel, Transportation, Training, Data, Costs.

This volume contains detailed techniques for estimating necessary maintenance, logistic, and cost parameters relevant to logistic and maintenance support system planning. Its intent is to develop for personnel charged with the responsibility of estimating design and logistic parameters, techniques which may be easily and reliably applied. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-432 084 Div. 8, 18
OTS price $12.00

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE EQUIPMENT MAINTENANCE AND LOGISTICS PROGRAM GENERAL OPERATIONAL READINESS MATHEMATICAL MODEL. VOLUME IV.
Final rept., 1 Apr-30 June 62.
30 June 62, 166p.
Contract DA36 039sc85980
Unclassified report

Descriptors: (*Logistics, Operation), (*Maintenance, Modules (Electronics)), (*Modules (Electronics), Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Modules (Electronic)), (*Operation, Mathematical models), Military requirements, Management engineering, Reliability (Electronics), Failure (Mechanics), Decision making, Procurement, Transportation, Electronic equipment, Costs, Electrical equipment, Processing, Time, Personnel.

The purpose of this volume is to develop logically the structure of the military operational readiness problem; formulate the problem analytically in terms of significant logistic, maintenance, and equipment design parameters; and subsequently develop an economic analysis technique (and procedure) which enables trade-offs among logistic, maintenance, and equipment support parameters. The volume in its entirely may be viewed as the decision process involved in logistic and maintenance planning. The logical flow of each significant variable encompassed in the operational readiness problem is developed as it relates to other variables. A sequential step-by-step evaluation is made of the influence of each variable as related to the objective of the Military support system. (Author)

AD-432 085 Div. 8, 18
OTS price $13.50

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE EQUIPMENT MAINTENANCE AND LOGISTICS PROGRAM CIRCUIT STANDARDIZATION, MOMENCLATURE, AND PACKAGING. VOLUME V.
Final rept., 1 Apr-30 June 62.
30 June 62, 195p.
Contract DA36 039SC85980
Unclassified report

Descriptors: (*Logistics, Circuits), (*Maintenance, Modules (Electronic)), (*Microminiaturization (Electronics), Modules (Electronic)), (*Modules (Electronic), Microminiaturization (Electronics)), (*Circuits, Standards), Radio receivers, Radio transmitters, Packaged circuits, Containers, Feasibility studies, Transportation, Packing materials, Radio equipment, Tables, Identification systems, Management engineering.

Contained in this volume of the final report are descriptions of the results obtained from Task 5, Circuit Standardization; Task 6, Identification and Nomenclature: and Task 7, Packaging; of the Micro-Module Maintenance and Logistics Program. Also included are brief discussions of the program administration and organization and the PERT network. The Circuit Standardization Program carried out had essentially a dual objective: (1) to perform a standardization feasibility study on a family of tactical radio equipments, and (2) to develop an implementation plan for the standardization of micro-module circuits. These two tasks were performed concurrently and are reported in detail in Section II of this volume. (Author)

AD-432 162 Div. 8, 5, 6
OTS price $21.00

Physical Science Lab., New Mexico State U., University Park.
FLUSH AND NONFLUSH MOUNTED TELEMETRY ANTENNAS. FLUSH MOUNTED COMMAND CONTROL ANTENNAS. S-BAND AND C-BAND BEACON TRANSPONDER ANTENNAS. ANTENNA SYSTEMS FOR SPECIFIC MISSILES, PROBES AND SATELLITES.
Final rept.,
by Henry D. Weinschel. 15 Oct 63, 355p.
Contract AF19 604 6198, Proj. 7659, Task 765901
AFCRL 63 594 Unclassified report

Descriptors: (*Rocket antennas, Sounding rockets), (*Telemetering antennas, Design), (*Antennas, Airborne), Propagation, Antenna radiation patterns, Electric potential, Heating, Antenna configurations, Command & control systems, S band, C band, Beacons, Transponders, Radar antennas, Guided missile antennas, Satellite antennas, Loop antennas, P band, Weight, Bandwidth, Electrical impedance, Space probes.

Research concerned a program to accomplish the following: conduct laboratory studies leading to development of antenna designs for research rockets and associated ground instrumentation systems; conduct propagation studies leading to the determination of radiation characteristics, voltage breakdown, and heating problems associated with rocket antenna configurations; and install rocket antennas in research rockets including Aerobee, Cajun, Spaerobee, Exos, Asp, Astrobee and other rockets. A photograph and/or assembly drawing is provided for each antenna discussed. The electrical characteristics of the various antenna types are presented by impedance versus frequency curves, by VSWR versus frequency curves, by patterns of the principle plane cuts and by power contour plots. The various antenna series types are discussed with the emphasis on the distinguishing feature of the antenna models. (Author)

AD-432 171 Div. 8
OTS price $5.60

Research Triangle Inst., Durham, N. C.
SELECTED EXPERIMENTS IN SILICON INTEGRATED DEVICE TECHNOLOGY.
Rept. for Jan 63-Feb 64,
by R. M. Burger. Mar 64, 54p.
Contract AF33 657 10340, Proj. 4159, Task 4159 05
AL TDR64 29 Unclassified report

Report on Design Parameters and Procedures for Functional Electronic Structures.

Descriptors: (*Integrated circuits, Manufacturing methods), Anodes, Cathodes, Oxidation, Silicon, Statistical processes, Steam, Impurities, Diffusion, Phosphine, Electrolytes, Cleaning.

The experimental work that was performed as supplementary investigation to the preparation of the 'Silicon Integrated Device Technology' series is presented. In addition to the five volumes of this series that were compiled, supporting experimental work was done in three areas: (1) anodic oxidation of silicon for integrated circuits; (2) statistical methods for the evaluation of laboratory processes, steam oxidation of silicon was the process considered initially; and (3) impurity diffusion into silicon from a gas source. Phosphine gas was the first impurity gas investigated. (Author)

AD-432 199 Div. 8
OTS price $16.50

Radio Corp. of America, Lancaster, Pa.
DIELECTRIC TO METAL SEAL TECHNOLOGY STUDY,
by A. C. Grimm and P. D. Strubhar. Oct 63, 258p.
Contract AF30 602 2682, Proj. 5573, Task 557303
RADC TDR63 472 Unclassified report

Descriptors: (*Electron tubes, Manfacturing methods), (*Microwave frequency, Electron tubes), Ceramic materials, Dielectric properties, Metal joints, Beryllium compounds, Oxides, Aluminum compounds, Magnesium compounds, Fluorides, Sapphires, Boron compounds, Nitrides, Chromium alloys, Cobalt alloys, Nickel alloys, Titanium alloys, Zirconium alloys, Iron alloys, Stainless steel.

The intent of the study program covered by this report was to develop improved dielectric-to-metal sealing techniques specifically for use with output windows for high-power microwave tubes. Four types of seals and six types of dielectric materials were investigated. Throughout the study a high-alumina-oxide content dielectric material commonly employed in window fabrication was used assa reference material for comparative evaluation of sealing techniques. Objectives of the program included development of seals that would be vacuum tight when baked at 700 Centigrade, or a minimum of 450 Centigrade, and would remain vacuum tight after being cycled 1000 times between 20 and 125 Centigrade. (Author)

AD-432 211 Div. 8
OTS price $2.60

Chatham Electronics Div., Tung-Sol Electric, Inc., Livingston, N. J.
PRODUCTION ENGINEERING MEASURE FOR TYPE 7890 SUPER POWER HYDROGEN THYRATRON.
Quarterly progress rept. no. 6, 8 June-7 Sep 63,
by C. L. Shackelford. 7 Sep 63, 27p.
Contract DA36 039sc85984
Unclassified report

Descriptors: (*Thyratrons, Production), Hydrogen, Life expectancy, Tests, Radiofrequency power, Aging (Materials), Tables, Electron tube parts, Performance (Engineering).

Two tubes were assembled and one given initial tests and a life test during the past period. The life test was possibly influenced by the lack of several proper parts in the tube which was constructed as a calculated risk. The life test did not run to the specified minimum time and indicated that greater reservoir capacity was necessary. Construction features of the next tubes in the series are detailed and discussed. (Author)

AD-432 212 Div. 8, 30
OTS price $7.60

Bell Telephone Labs Inc., Whippany, N. J.
ENGINEERING SERVICES ON TRANSISTORS.
Quarterly progress repts. no. 2 and 3, 1 July-30 Sep 63,
by S. R. Arnold, D. J. D'Stefan, G. F. Foxhall, J. E. Iwersen and J. Kocsis. 30 Dec 63, 80p.
Rept. no. 13
Contracts DA36 039sc90759, DA36 039AMC02227E,
Proj. 3A99 21 001
Unclassified report

Descriptors: (*Transistors, Germanium), (*Integrated circuits, Transistors), Ultrahigh frequency, Superhigh frequency, Oxides, Electrodes, Capacitance, Diffusion, Electrons, Resistance (Electrical), Computers, Photoengraving, Manufacturing methods, Fixed contacts, computer logic, Surface properties, Bonding, Silver, Aluminum.

Efforts were continued on studies and investigations related to transistors and transistor-like devices, with a view toward demonstrating and increasing the practicability of their use in operating equipment. A discussion is given of work on a 1-Gc, 1-watt germanium transistor and a 6-Gc low-power germanium transistor and integrated circuit devices. The status of the work on the germanium microwave transistors is discussed. Techniques and problems related to the oxide-photoengraved planar transistor structure fabrication are covered. A new method of determining emitter depletion layer capacitance is described and experimental results given. Results of a calculation of effective mobility and diffusion coefficient for electrons and holes in germanium are given which will permit more accurate estimates of base transit time and base resistance of high-frequency transistors. The integration of a small part of a high-speed general purpose military computer is described. DCTL was used and 4- to 5-ns propogation delay was obtained. (Author)

AD-432 222 Div. 8, 5
OTS price $9.60

Motorola, Inc., Phoenix, Ariz.
COMPATIBLE TECHNIQUES FOR INTEGRATED CIRCUITRY.
Quarterly rept. no. 10, 1 Aug-31 Oct 63.
31 Oct 63, 112p.
Contract AF33 616 8276
Unclassified report

Descriptors: (*Integrated circuits, Transistors), (*Transistors, Integrated circuits), (*Semiconducting films, Integrated circuits), Manufacturing methods, Silicon, Diffusion, Processing, Transmitter receivers, Radiofrequency amplifiers, Intermediate frequency amplifiers, Digital systems, Communication systems, Current regulators, Capacitors, Dioxides, Silicon compounds, Resistors, Nickel alloys, Chromium alloys, Electron switches, Mechanical drawings, Electromagnetic shielding, Thickness.

Contents: Thin film techniques; Circuits; Silicon integrated circuit technology; Compatible NPN and PNP transistors; Monolithic NPN and PNP transistors; Photolithographic process; Controlling the base width of diffused structures; Profile superposition; Experimental procedure; Transreceiver; RF amplifier; IF amplifier; Audio; Digital communications system; Packaging design; Circuit designs; Amplifiers; Current source and voltage reference; Reference switch design; and Circuit fabrication and evaluation.

AD-432 225 Div. 8
OTS price $1.60

Westinghouse Electric Corp., Baltimore, Md.
DEVELOPMENT OF THE MIRRECHON SIGNAL STORAGE TUBE.
Quarterly rept. no. 3, Nov 62-Jan 64,
by A. S. Jensen, M. P. Siedband, E. F. Wood and R. A. Yeates. Jan 64, 14p.
Contract NObsr89303, Proj. SR008 03 04, Task 9486
Unclassified report

Descriptors: (*Storage tubes, Electron optics) Focusing, Electrostatic fields, Deflection, Electron multipliers, Electron lenses, Electron guns, Secondary emission, Coatings, Manufacturing methods.

Efforts were continued on the development of the WX-3867 Mirrechon signal storage tube. The WX-3867 will be capable of electric charge pattern storage, nondestructive reading, gray scale, simultaneous reading, writing and erasing without excessive crosstalk, electrostatic focus and deflection and electron multiplier output. It will be approximately 4 inches in diameter and 15 inches long. Experiments on storage target making continued. Development of new lens was begun. Spiral type lenses were made and tested. The first sealed off tube was completed. (Author)

AD-432 237 Div. 8
OTS price $2.60

Microwave Electronics Corps., Palo Alto, Calif.
DEVELOPMENT OF PPM-FOCUSED LOW-NOISE TRAVELING-WAVE TUBES FOR Ku-, K-, AND Ka-BAND.
Interim development rept. 2, 1 Oct-31 Dec 63.
Feb 64, 24p.
Contract Nobsr89323, Proj. SR0080304, Task 9293
Unclassified report

Descriptors: (*Travelling wave tubes, K band), Magnets, Focusing, Noise (Radio), Helixes, Design, Magnetic fields, Vacuum apparatus, Test equipment, Tables, Gain.

Contents: Ku-band low noise tube; RF test in the solenoid; Evaluation of the vacuum encelope design; Noise figure of medium gamma (a) tubes; Noise figure of low gamma (a) tubes; Helix dispersion; PPM stack; K-band low-noise tube; Evaluation of the initial vacuum envelope design; Ka-band low noise tube.

AD-432 253 Div. 8
OTS price $.75

Naval Research Lab., Washington, D. C.
FLEXIBLE COAXIAL CABLE,
by J. A. Guida. 18 Feb 64, 20p.
NRL 6045 Unclassified report

Descriptors: (*Coaxial cables, Mechanical properties), Electrical properties, Transmission lines, Broadband, Bandwidth, Fatigue (Mechanics), Standing wave ratios, Microwave frequency, Electrical impedance, Test equipment, Test methods, Failure (Mechanics), Electric connectors.

Flexible coaxial cables of the helical dielectric and corrugated outer-conductor construction were investigated for possible use as a broadband transmission line and as a substitute for limited rotary joints for the proposed 600-ft antenna of the former Naval Radio Research Station, Sugar Grove, West Virginia. The 7/8-in.-diam cable would have been unsuitable in broadband transmission up to 4400 Mc due to the high VSWR (exceeding 3) which occurs over a narrow bandwidth of about 100 Mc centered near 3600 Mc. This high VSWR is attributed to the cable's helical dielectric construction. As a substitute for a limited rotary joint the 7/8-in.-diam cable would have a lifetime of about 2000 bending cycles before mechanical failure of the end connectors. Fatigue fracture of the inner conductor occurred at 10,000 bending cycles. Cable of 1-5/8-in.-diam was found to have a bending life of nearly 1000 cycles before fatigue failure of the outer conductor. Above 1800 Mc this cable also appeared unusable because of high VSWR. The mechanical limitations and anomalous performance at microwave frequencies would prohibit the use of these sizes of cable for suitable operation in the microwave region. The anomalous effect was suspected and is believed due to the helical dielectric construction. A literature search indicates that this effect has not been analytically explained. (Author)

AD-432 255 Div. 8
OTS price $3.60

Harry Diamond Labs., Washington, D. C.
TEMPERATURE COMPENSATION OF ASTABLE MULTIVIBRATORS,
by Ira R. Marcus and Alan D. Smith. 20 Jan 64, 36p.
HDL Proj. 46300
HDL TR1186 Unclassified report

Descriptors: (*Oscillators, Circuits), (*Stability, Oscillators), (*Temperature, Stability), Transistors, Diodes (Semiconductor), Electric potential, Power supplies, Time signals, Digital systems.

A study was made to determine the limits to which the frequency of astable multivibrators could be stabilized against temperature and power-supply voltage variations so that they could be used as a time base in electric time fuzes and programmers. The temperature range was -55 to +75 C, and the voltage variation was ±20 percent. The frequency was about 100 cps. Four different circuits are developed. One circuit yielded ±0.06 percent frequency stability over the temperature and voltage range. (Author)

AD-432 271 Div. 8
OTS price $2.60

General Electric Co., Schenectady, N. Y.
PRODUCTION ENGINEERING MEASURE FOR VOLTAGE-TUNABLE MAGNETRONS.
Quarterly progress rept. no. 6, 18 July-18 Oct 63,
by E. G. Soulier. 18 Oct 63, 26p.
Contract DA36 039SC86722
Unclassified report

Descriptors: (*Magnetrons, Tuning devices), (*Tuning devices, Electric potential), (*Electric potential, Tuning devices), Production, Manufacturing methods, Cathodes (Electron tubes), Heat treatment, Vacuum apparatus, Emissivity, Life expectancy, Brazing, Jigs, Electron tube parts.

The formal engineering phase of the program has been completed. The results and conclusions to the manufacturing sections' filament-processing investigation are stated. As a result of the investigation, a hydrogen-flashed filament will be used for this program. The preproduction run has been initiated and results obtained thus far are given. The yields for each tube assembly are stated. Packaging assembly for both package types are discussed. Results in the quality control areas on procedures and schedules are given. (Author)

AD-432 277 Div. 8, 30
OTS price $3.60

David Taylor Model Basin, Washington, D. C.
A DIGITAL FILTER FOR SEPARATING HIGH- AND LOW-FREQUENCY COMPONENTS OF A TRANSIET SIGNAL,
by Thomas L. Geers and Stewart A. Denenberg.
Jan 64, 39p.
Proj. S F013 10 01
DTMB 1795 Unclassified report

Descriptors: (*Filters (Electromagnetic wave), Transients), Programming (Computers), Programming languages, High-pan filters, Low-pan

filters, Integral equations, Magnetic tape, Digital computers.

A filter is described which separates a transient signal into high- and low-frequency portions and introduces no phase shifts or amplitude changes in either portion. A program written in FORTRAN for an IBM 7090 computer which will filter a sampled time-history record is presented. Simple formulas are given for estimating errors in the filter that are due to sampling and truncation of the continuous record. Application of the filter to signals produced by two or more physical sources is discussed. (Author)

AD-432 279 Div. 8
OTS price $4.60

General Dynamics, Fort Worth, Tex.
A VERTICAL ARRAY OF TWO LOG PERIODIC DIPOLE ARRAY ANTENNAS,
by J. H. Owens. 25 Feb 64, 43p. Rept. no. FZE271
Unclassified report

Descriptors: (*Dipole antennas, Coupled antennas), (*Coupled antennas, Dipole antennas), (*Airplane antennas, Dipole antennas), Broadband, Standing wave ratios, Antenna radiation patterns, Electrical impedance, Design, Measurement, Test facilities, Antenna feeds, Ultrahigh frequency.

A broadband, horizontally polarized, log periodic dipole array antenna was developed for installation on an airplane. The antenna system consists of a parallel combination of two array antennas with constant electrical spacing and operates over a 1.67 octave frequency band with a voltage standing wave ratio less than 2 to 1 referred to 50 ohms. A radiation pattern gain greater than 9db compared to an isotropic source was obtained. Both development and production data are included in the report. (Author)

AD-432 280 Div. 8
OTS price $3.60

General Dynamics/Fort Worth, Tex.
LARGE AIRBORNE LOG PERIODIC DIPOLE ARRAY ANTENNA,
by J. H. Owens. 25 Feb 64, 33p. Rept. no. FZE273
Unclassified report

Descriptors: (*Dipole antennas, Airborne), Broadband, Antenna configurations, Polarization, Standing wave ratios, Antenna radiation patterns, Gain, Admittance, Metal plates, Beams (Electromagnetic), Airplane antennas, Antenna lobes.

A broadband, horizontally polarized, log periodic dipole array antenna was developed. The antenna is operated over a 6.0:1 frequency band with a VSWR of less than 3.0:1 referred to 72 ohms, and it provides a radiation pattern gain greater than 7 db compared to an isotropic source. Both development and production data are included. (Author)

AD-432 292 Div. 8
OTS price $1.60

Sperry Gyroscope Co., Great Neck, N. Y.
DEVELOPMENT OF AN ELECTRON BEAM DUPLEXER.
Quarterly progress rept. no. 3, 1 Sep-30 Nov 63, by B. Kleinman and E. Hine. Dec 63, 20p. Rept. no. NA8210 8352 3
Contract DA36 039AMC02174E, Proj. 1G6 22001A 055 04
Unclassified report

Descriptors: (*Radar duplexers, S band), (*S band, Radar duplexers), Power, Coupling circuits, Helixes, Production, Performance (Engineering), Electron tubes, Standing wave ratios, Coaxial cables.

Design calculations were refined and are presented in this report. The first S-band tube was tested for its high power performance, and design changes were made to improve this characteristic. A new coaxial coupler was developed, which gives substantial improvement in the match to the helix. Tube No. 2, incorporating the changes dictated by the tests performed on the first tube, has been built and now awaits processing and testing. (Author)

AD-432 315 Div. 8, 26
OTS price $16.50

Bendix Semiconductor Div., Bendix Corp., Holmdel, N. J.
PRODUCTION RELIABILITY IMPROVEMENT PROGRAM FOR GERMANIUM TRANSISTOR 2N1430. VOLUME II.
Final rept., 30 Apr 62-31 Oct 63.
31 Oct 63, 260p.
Contract DA36 039SC86723
Unclassified report

Descriptors: (*Transistors, Quality control), (*Instruction manuals, Quality control), (*Quality control, Transistors), Germanium, Reliability (Electronics), Production, Manufacturing methods, Semiconductor devices.

Efforts concerned a production reliability improvement program for germanium transistor 2N1430. An instruction manual for the implementation of a quality control plan is presented. The procedures shall be applicable to all manufacturing, processing, and inspection operations carried out on all types of semiconductor products. (Author)

AD-432 325 Div. 8, 26
OTS price $10.10

Bendix Semiconductor Div., Bendix Corp., Holmdel, N. J.
PRODUCTION RELIABILITY IMPROVEMENT PROGRAM FOR GERMANIUM TRANSISTOR 2N1430.
Final rept. 30 Apr 62-31 Oct 63,
by John Nussear, Henry Sivik and John Szafranski.
31 Oct 63, 125p.
Contract DA36 039SC86723
Unclassified report

Report on Production Engineering Measure.

Descriptors: (*Transistors, Manufacturing methods), (*Manufacturing methods, Transistors), Germanium, Production, Reliability (Electronics), Tests, Resistance (Electrical) Crystal growth, Chemical milling, Diffusion, Alloys, Specifications, Processing, Industrial equipment.

This Production Engineering Measure has established the capability of manufacturing an improved version of the 2N1430 Germanium Diffused Alloy Power Transistor with very satisfactory yields. The improved techniques have resulted in a reliable product which satisfies the objective failure rate of 0.05%/1000 hours with 90% confidence. The estimate of failure rate after incorporation of the various production improvements was less than 0.01%/1000 hours. All required samples have been delivered, all production equipment modifications completed and

appropriate quality and reliability testing performed to demonstrate the success of the operation. (Author)

AD-432 394 Div. 8, 6
OTS price $1.60

Electromagnetic Technology Corp., Palo Alto, Calif.
FREQUENCY CONVERTER UNITS FOR L-BAND, S-BAND, C-BAND, AND X-BAND.
Interim development rept. no. 8, 1-29 Feb 64.
13 Mar 64, 15p.
Contract Nobsr89536, Proj. SF0100201, Task 9294
Unclassified report

Descriptors: (*Frequency converters, Design), L band, S band, C band, X band, Crystal rectifiers, Radiofrequency power, Low-pass filters, High-pass filters, Automatic, Test-equipment (Electronics), Impedance matching, Crystal holders, Klystrons, Scheduling.

The developmental frequency converter based on a 3 db directional coupler was built and tested. The directional coupler has suitable characteristics. However, the impedance matches in both K-band and at lower frequencies are unsatisfactory. Modifications to improve both responses are under way. The special crystal from Gc Electronics was received and tested. Its power handling capability appears good. However, the conversion loss is rather high, and the prospects of obtaining an acceptable impedance match over S-band are poor. An experimental S-band down converter using a single 1N53B crystal was set up and tested. Without tuning and with no special matching network in the IF line, the conversion loss averaged 11 db over S-band, varying between 9 and 13 db. Automated apparatus to record the K-band rectification characteristics of various diodes is being prepared. This apparatus will expedite the work of inspecting new diodes and of determining if diodes have been injured during other tests. Impedance tests of diodes continued during the interval. The principal outcome of this work is demonstration of a considerable interaction between input and output impedances in both up converter and down converter operation. (Author)

AD-432 401 Div. 8
OTS price $1.10

Microwave Electronics Corp., Palo Alto, Calif.
DEVELOPMENT OF LOW NOISE TRAVELING-WAVE TUBES. PHASE III: ENVIRONMENTALIZATION.
Monthly status letter no. 24, 1 Jan-1 Feb 64, by A. C. Ashley. 1 Feb 64, 10p.
Contract NObsr81227
Unclassified report

Descriptors: (*Traveling wave tubes, Life expectancy), X band, C band, S band, Manufacturing methods, Production, Performance (Engineering), Electric current, Temperature.

A total of five tubes were on life test during the reporting period. By the end of the period, the X-band life test tube had passed 3000 hours, the two S-band life test tubes had passed 1300 hours, and the two C-band life test tubes had operated less than 1000 hours. (Author)

AD-432 413 Div. 8
OTS price $12.50

General Electric Co., Philadelphia, Pa.
TIMM DATA STORAGE SYSTEM.
Feb 64, 174p.
Contract AF29 601 6043, Proj. 8809
RTD TDR63 3104 Unclassified report

Descriptors: (*Data storage systems, Magnetic recording systems), (*Radiation damage, Electronic equipment), Electromagnetic waves, Electronics, Circuits, Amplifiers, Design, Modules (Electronics), Shock (Mechanics), Vibration, Reliability (Electronics), Radiation tolerance, Manufacturing methods, Thermionic converters, Fourier analysis.

This document describes a data gathering appartus, namely a magnetic tape recorder system, which will be extremely insensitive to nuclear radiation of relatively high levels. It is based upon the use of TIMM (thermionic integrated micro-module) components in electronic circuits which, from a radiation standpoint, are critical circuits. Critical circuits are defined as circuits which influence directly the overall data system accuracy. The document consists of two major sections. The first section discusses the overall system implementation, while the second section describes the efforts as sociated with the design and fabrication of a TIMM amplifier. The radiation hardening techniques are also described. (Author)

AD-432 414 Div. 8, 12
OTS price $19.75

Smyth Research Associates, San Diego , Calif.
TARGET ACCURACY EXPERIMENT,
by L. R. Hughes, J. H. Gibbs and L. A. Morgan.
Feb 64, 328p. Rept. no. 356
Contract AF30 602 2084
RADC TDR63 460 Unclassified report

Descriptors: (*Space surveillance systems, Performance (Engineering)), Satellites (Artificial), Tracking, Errors, Radio signals, Distortion, Position finding, Meteorological parameters, Ionosphere, Atmospheric refraction, Troposphere, Tables, Ionospheric propagation, Atmospheric sounding, Radio interferometers, Radio transmission, Electromagnetic waves.

The Earth's atmosphere distorts the radio view of space vehicles as seen from the earth's surface. The limitations placed on ones ability to position and locate objects in space as a consequence of this distortion is the subject of the reported investigations. A detailed experimental program was pursued to measure particularly the elevation angle errors incurred in making space target measurements from the earth's surface when viewing near the horizon. Signals originating in artificial earth satellites were viewed through the distorting atmospheric medium and analyses performed to define the observed distortions as a function of space, frequency, and time. (Author)

AD-432 464 Div. 8
OTS price $4.60

Westinghouse Electric Corp., Pittsburgh, Pa.
LONG LIFE CLOSED LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
Interim scientific rept. no. 8, 15 Dec 63-29 Feb 64.
3 Mar 64, 48p.
Contract AF33 657 8311
Unclassified report

Descriptors: (*Magnetohydrodynamics, Scientific research), Electrodes, Welding, Tests, Instrumentation, Thermocouples, Heaters, Cesium, Helium, High temperature research,

Zirconium compounds, Oxides, Tantalum, Thermal insulation, Probes (Electromagnetic), Test equipment (Electronic).

The Closed Loop MHD Research and Development Unit is in the final stages of preparation for the next test. Several minor modifications have been made in the over-all system, however, none of the basic features have been changed. Modifications primarily have been concerned with decreasing the heat losses from the system and increasing the heat input to the system so as to permit operation with working fluids at higher temperatures. Other modifications include instrumentation additions and refinements. A new closed loop duct with ceramic lined end returns has been partially fabricated. (Author)

AD-432 477 Div. 8, 26
OTS price $2.60

TRW Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE RELIABILITY THRU PROCESS IMPROVEMENT (2N1506).
Quarterly rept. no. 5, 30 Jun-30 Sep 63,
by R. Austin, G. Kamienski, P. Kellow, J. Logan, and I. Massaron. 30 Sep 63, 22p. Rept. no. 3000 43Q5
Contract DA36 039sc86742
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), Diffusion, Encapsulation, Processing, Production, Tests, Life expectancy, Silicon, Reliability (Electronics), Fixed contacts, Impurities, Bonding, Electrodes.

Conditions are ready to start the production run. Two areas, lead attachment and encapsulation, require additional engineering effort. Recent linear life test results show low failure rate. The failures are being investigated and information utilized for additional process improvements. (Author)

AD-432 492 Div. 8, 26
OTS price $7.60

Hamilton Standard Div., United Aircraft Corp., Windson Locks, Conn.
ENHANCED MICRO-MODULE INTERCONNECTIONS. (AN HERMETIC PACKAGING SYSTEM FOR THE INTEGRATION OF MICRO CIRCUITS).
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by G. F. Lang and D. J. Garibotti. 31 Dec 63, 75p. Rept. no. HSER2858
Contract DA36 039AMC03620E
Unclassified report

Descriptors: (*Integrated circuits, Manufacturing methods), Fixed contacts, Welding, Electron beams, Automatic, Programming computers, Tests, Vibration, Failure (Mechanics), Seals (Stoppers), Modules (Electronic).

Effort was directed toward the evolution of previously developed processes into manufacturing techniques. In addition, electrical testing procedures were compiled and test circuits assembled and checked-out. Twenty solid-state microcircuit wafers, each provided with two integrated circuits were assembled, tested, and submitted as samples. Several microwafer stack -- header transfer wafer assemblies have been fabricated. These units are provided with microwafers with suitably shorted terminations to permit weld resistance monitoring during vibration to detect any potential open circuits. The majority of the machines required for the establishment of the pilot line have been designed and are in the process of being fabricated and assembled. A 'wired' electronic programmer for the automatic electron beam welding of the copper ribbons and hermetic sealing of the structure has been build and successfully tested. (Author)

AD-432 597 Div. 8, 25
OTS price $2.60

Westinghouse Defense and Space Center, Baltimore, Md.
DEVELOPMENT OF MILLIMETER AND SUBMILLIMETER MASER DEVICES.
Interim technical rept. no. 3, 1 Oct 63-31 Jan 64,
by W. E. Hughes. 31 Jan 64, 30p.
Contract AF33 657 10472
Unclassified report

Descriptors: (*Masers, Millimeter waves), (*Millimeter waves, Masers), Iron, Tungsten alloys, Zinc alloys, Dielectric properties, Cavity resonators, Pumping (Electronics), Mathematical analysis, Quantum mechanics.

The third reporting period has been devoted to the study of iron doped (Fe^{3+}) zinc tungstate ($Zn\ WO_4$) as a possible new quantum amplifier material. The solutions to the spin Hamiltonian have been obtained so that identification of energy levels is possible, and a computer program for the solution of radiation-induced transition probabilities has established. Since the dielectric constant of the zinc tungstate is considerably lower than that of the materials used previously, it has been necessary to make several changes in the experimental apparatus. Several pumping techniques, including the five level technique, will be investigated in zinc tungstate. During this period, operating points were chosen from the computer solutions of the Hamiltonian. (Author)

AD-432 665 Div. 8
OTS price $4.60

Sylvania Electric Products, Inc., Buffalo, N. Y.
V-BAND HARMONIC GENERATOR DEVELOPMENT PROGRAM.
Final rept.
3 Dec 63, 43p. Rept. no. A103 004 5 0 56
Contract DA30 069ORD3705
Unclassified report

Descriptors: (*Harmonic oscillators, V band), (*Varactor diodes, Harmonic oscillators), Extremely high frequency, X band, Frequency multipliers, Klystrons, Mixers (Electronic), Millimeter waves, Waveguides, Radiofrequency power, Microwave oscillators, K band, Crystal mixers, Direct current, Gallium alloys, Arsenic alloys, Temperature.

Research concerned a program to develop and fabricate an all-solid-state V-band harmonic generator having a cw power output of 3 mw at 68 gc. (Author)

AD-432 692 Div. 8
OTS price $8.10

Watkins-Johnson Co., Palo Alto, Calif.
RADIO INTERFERENCE MEASURING SET AN/URM-100 (XE-1).
Quarterly technical rept. no. 1, 26 June-25 Sep 63,
by William E. Budd, Robert C. Hilquist, Marshall H. Holliman, Eddy Hose and Allan W. Shaw. 25 Sep 63, 85p. Rept. no. W J63 621R3
Contract DA36 039AMC02328E

Unclassified report

Descriptors: (*Measuring devices (Electrical & electronic), Radio interference), (*Radio interference, Measuring devices (Electrical & electronic)), Yttrium, Iron, Garnet, Filters (Electromagnetic wave), Multiplex, Bandwidth, Traveling wave tubes, Mixers (Electronic), Oscillators, Data processing systems, Linear systems, Gain, Amplifiers.

System concepts, microwave front-end, data handling design and special circuit design were investigated and analyzed to the point that a comprehensive design can be undertaken. The degree, speed, and type of automation consistent with a flexible test-bed model were resolved as well as the realization of several operational tests and procedures needed to overcome the limitations of practical equipment. The specification and design of many YIG devices in the front-end were conducted as were investigation into the satisfactory construction of high-speed tuning techniques for these devices. Ultra-low-noise traveling-wave tubes, YIG-stabilized BWO local oscillators and associated microwave components were studied and their integration into the system delineated. Data handling considerations resulted in an approach which will make use of relatively simple digital equipment with the capability of fully automated programming and data processing any time desired. (Author)

AD-432 697 Div. 8, 16
OTS price $8.10

Loral Electronics Corp., New York.
DESIGN AND INVESTIGATION OF LOW FREQUENCY SPACE ANTENNAS.
Final rept.
Jan 64, 85p.
Contract AF19 628 1670, Proj. 4603, Task 460312
AFCRL 64 69 Unclassified report

Descriptors: (*Antennas, Inflatable structures), (*Inflatable structures, Antennas), (*Low frequency, Antennas), Loop antennas, Radar antennas, Reflectors, Antenna radiation patterns, Electrical properties, Configuration, Production, Plastics, Metal films, Air, Radar confusion reflectors, Polyester plastics.

A group of inflatable structures known as LILA, SAL, RITA, RIA, LISA, DEB, PAM, IDA and others are discussed. The physical and electrical problems of theses inflatables are discussed and evaluated. It is shown that inflatable structures are solutions in certain problems that cannot be solved in any other manner. These units are shown to be lightweight, reliable, durable and easily erected when desired. (Author)

AD-432 709 Div. 8, 19
OTS price $8.60

Collins Radio Co., Cedar Rapids, Iowa.
VOR, DUAL-SIDEBAND EQUIPMENT.
Final rept.
Dec 63, 91p. Rept. no. CER1669A
Contract FAA BRD404, Proj. 115 21D
Unclassified report

Descriptors: (*Radio navigation, Radio transmitters), (*Radio transmitters, Radio navigation), Very high frequency, Doppler system, Direction finding stations, Radio stations, Direction finding, Side bands, Antenna feeds, Goniometers.

The FAA/BRD-404 dual-sideband doppler VOR system consists of a dual-sideband vhf transmitter and dual-rotor distributor developed for use with the FAA doppler VOR ground station. The dual-sideband transmitter consists of a sideband generator frequency and phase locked to a carrier transmitter, sideband amplifiers, and power amplifiers The output of the sideband transmitter is 100 watts per sideband. The dual-rotor distributor is a capacity type distributor which switches the two sideband inputs to 50 antenna outputs. The sideband inputs are fed simultaneously to opposite antenna outputs. Opposite sideband suppression is 30 db and carrier suppression is 40 db at the output. Adjacent antenna output isolation is 30 db and isolation to the remaining antenna outputs are 50 db or more. The use of a dual-sideband system in the doppler VOR ground system is possible and should show improvement over a single-sideband system. (Author)

AD-432 800 Div. 8, 12, 18
OTS price $4.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN). MINUTES OF SYLVANIA/BOEING LECS/LEES T.I. MEETING HELD AT SYLVANIA ELECTRONICS SYSTEMS 275 WYMAN ST., WALTHAM, MASS.
by M. M. Cerier, Leith Pike and J. S. Shambaugh.
1964, 49p.
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Ground support equipment), (*Ground support equipment, Guided missiles (Surface to Surface)), Specifications, Circuits, Display systems, Electronic equipment, Filters, (Electromagnetic wave), Weapon systems, Command & control systems.

AD-432 829 Div. 8
OTS price $2.60

Thayer School of Engineering, Dartmouth Coll., Hanover, N. H.
STUDIES OF WHISTLERS AND AUDIO-FREQUENCY EMISSIONS.
Final rept., 1 Oct 61-31 Oct 62,
by Millett G. Morgan. 19 Aug 63, 27p.
Contract AF19 604 8468, Proj. 8653, Task 865302
AFCRL 63 773 Unclassified report

Descriptors: (*Atmospherics, Measurement), Audiofrequency, Timing circuits, Current amplifiers, Trigger circuits, Pulse generators, Oscilloscopes, Test equipment (Electronics), Propagation, Extremely low frequency, Very low frequency, Periodicals.

This report includes: Some results of five years of Whistler observations from Labrador to Antarctica, by T. Laaspere, M. G. Morgan and W. C. Johnson. (Reprint from the Proceedings of the IEEE, 51:4, pp. 554-568, Apr 63). (Author)

AD-432 859 Div. 8, 70
OTS price $1.60

Litton Systems Inc., Woodland Hills, Calif.
(No Title)
Progress rept. for Apr 63.
Apr 63, 15p.
Contract AF33 657 10584
Unclassified report

Descriptors: (*Transistor amplifiers, Radiation damage), (*Radiation damage, Transistor amplifiers), Electrical properties, Transients, Performance (Engineering), Neutrons, Data, Tables, Preamplifiers.

AD-432 885 Div. 8, 26
OTS price $4.60

Hughes Aircraft Co., Newport Beach, Calif.
ADVANCED FUNCTIONAL ELECTRONIC BLOCK DEVELOPMENT.
Interim engineering rept. no. 5, 15 Sep-15 Dec 63
by H. G. Dill and R. Zuleeg. 15 Dec 63, 41p.
Contract AF33 657 9771
Unclassified report

Descriptors: (*Transistors, Metal films), (*Metal films, Transistors), (*Circuits, Transistors), Electric fields, Linear systems, Non-linear systems, Temperature, Amplifiers, Production, Manufacturing methods, Gates (Circuits), Cadmium alloys, Sulfides, Silicon, Gain, Performance (Engineering), Molecular electronics, Bandwidth.

AD-432 894 Div. 8
OTS price $1.60

Cornell-Dubilier Electric Corp., New Bedford, Mass.
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200 DEGREES C.
Quarterly rept. no. 11, for period ending 27 Jan 64,
by Paul C. Ricard. 27 Jan 64, 12p.
Contract DA36 039sc85955
Unclassified report

Descriptors: (*Fixed capacitors, Manufacturing methods), (*Ceramic capacitors, Manufacturing methods), Production, Fluorination, Barium compounds, Titanates, Capacitors, High-temperature research, Encapsulation, Life expectancy, Zirconium compounds, Silicates, Silicone plastics, Tests, Soldering, Tensile properties, Dielectric properties.

Capacitors utilizing the high temperature soldered construction and zirconium silicate filled silicone resin encapsulant gave satisfactory life test results. Capacitors of CK63 style can now meet the terminal lead strength requirements of five pounds and the 50 volt thin dielectric units can successfully meet the three pound requirement. Manufacture of all pre-production items was completed. These units are now being tested in accordance with pre-production inspection outlined in SCS-37 (Author)

AD-432 901 Div. 8, 26
OTS price $2.60

Texas Instruments Inc., Dallas.
PRODUCTION ENGINEERING MEASURES TO INCREASE TRANSISTOR RELIABILITY.
Quarterly progress rept. no. 4, 1 Feb-30 Apr 63.
13 Mar 64, 28p.
Contract DA36 039sc86730
Unclassified report

Descriptors: (*Transistors, Production), (*Production, Manufacturing methods), (*Manufacturing methods, Transistors), Physical properties, Diffusion, Epitaxial growth, Photoengraving, Configuration, Electric terminals, Reliability (Electronics), Temperature.

The major areas of engineering activity during this report period were on the following process steps: Epitaxial material; Cleanliness prior to high temperature diffusion; Photo masking; Contact materials. (Author)

AD-432 926 Div. 8, 7
OTS price $4.60

International Resistance Co., Philadelphia, Pa.
PRODUCTION ENGINEERING MEASURE FOR HIGH RELIABILITY, FIXED, FILM, PRECISION RESISTORS.
Quarterly progress rept. no. 4, 1 Oct-31 Dec 63,
by Richard C. Wagner. 31 Dec 63, 49p.
Contract DA36 039AMC01461E
Unclassified report

Descriptors: (*Resistors, Metal films), (*Metal films, Production), (*Production, Manufacturing methods), (*Manufacturing methods, Resistors), Reliability (Electronics), Life expectancy, Failure (Mechanics), Tables, Electrical terminals, Performance (Engineering).

The Small Spiral End-Skip evaluation had progressed to where units have been placed on life test. Although no detrimental performance effects have been noted, End Skips do contribute to yield losses because they are out of tolerance. The Initial Termination Width experiments were completed and new limits for acceptable termination width established. Expanded experiments are in process and are directed towards the elimination of Termination Inspection. Designs were completed for the Sub-assembly Machine, Termination Inspection Machine, and Sequential glass Sealing Machine. The first leadless spiralling group exceeded an acceptable tolerance span. They are, however, being processed to completion for life testing. A second group of units are being processed on equipment modified to produce a better tolerance span and more uniform product. (Author)

AD-432 928 Div. 8
OTS price $5.60

National Co., Inc., Malden, Mass.
CESIUM BEAM TUBE STUDIES.
Quarterly progress rept. no. 1, 1 July-1 Oct 63,
by J. George, T. Athanis and P. Crandell.
1 Oct 63, 55p.
Contract DA36 039AMC02367E, Proj. 1G6 22001A058
Unclassified report

Descriptors: (*Cesium electron tubes, Stability), Analysis, Magnetic fields, Shielding, Resonance, Bandwidth, Microwaves, Phase studies, Electromagnetic shielding, Cavity resonators, Collimators.

An analysis is presented of three main areas: cesium beam optics efficiency; C-field homogeneity; and microwave fields and phase. The results of the analysis are presented and the design of the experiments on cesium beam effusion patterns, C-field homogeneity, magnetic shielding, microwave field homogeneity, and cavity phase was initiated. (Author)

AD-432 930 Div. 8, 26
OTS price $4.60

E. B. Lewis Co., Inc., East Hartford, Conn.
PRODUCTION ENGINEERING MEASURE CRYSTAL UNIT CR-(XM-46)/U.
Quarterly rept. no. 5, Aug-Nov 63,
by Robert P. McComb. 1 Nov 63, 43p.
Contract DA36 039sc86737
Unclassified report

Descriptors: (*Quartz resonators, Manufacturing methods), Production, Crystal filters, Very high frequency, Plating, Capacitance, Resistance (Electrical), Attenuation.

PEM on quartz crystals for filter applications, a discussion of work performed on the CR-XM-

46)/U in the frequency range 30 - 60 MC/s and an evaluation of a new plating configuration at 30 MC/s are presented. Also discussed is work performed at 60 MC/s concerning the effect of plate back on the level and distribution of unwanted modes. A brief discussion of problems encountered in measuring filter crystals parameters is given. (Author)

AD-432 940 Div. 8, 20, 30
OTS price $16.50

Boeing Co., Seattle, Wash.
ANALYTICAL METHODS FOR PREDICTING TRANSIENT NUCLEAR RADIATION EFFECTS ON ELECTRONIC CIRCUITS AND DEVICES.
Rept. for Mar 62-Mar 63.
July 63, 255p.
Contract AF29 601 5238, Proj. 5776, Task 577602
RTD TDR63 3007 Unclassified report

Descriptors: (*Electronic equipment, Radiation damage), (*Radiation damage, Electronic equipment), (*Mathematical prediction, Radiation damage), Transistors, Diodes (Semiconductor), Capacitors, Resistors, Performance (Engineering), Dose rate, Circuits, Detectors, Computer logic, Neutrons, Networks, Servomechanisms, Preamplifiers, X-rays, Transients.

This method employs generalized radiation equivalent circuits for each component of the circuit or system. The component equivalent circuits are combined for circuit and system prediction using standard electrical engineering methods of circuit analysis, and the resulting circuit equations are solved on either an analog or digital computer. Four component equivalent circuits have been developed for use in circuit analysis. Detailed component equivalent circuits and their associated constants and circuit equations are presented for use in analyzing the behavior of these circuits in a generalized radiation environment. This method has been applied to the prediction of the response of four guidance and control circuits for flash X-ray, linac, and nuclear weapon environments, and of a simple servo loop for the flash X-ray and linac environments. The results of the prediction were compared with experimental results in the same environments. Within the scope of present knowledge of the component and environment variations, this comparison has resulted in excellent agreement for both the real time pulse shapes and the signal amplitude for radiation rates up to 10 to the 9th power r/sec. (Author)

AD-432 964 Div. 8
OTS price $2.60

Inland Testing Labs., Dayton, Ohio.
QUARTZ CRYSTAL RELIABILITY STUDIES.
Quarterly rept. no. 2, 1 Oct 63-1 Jan 64,
by Carleton E. Jones. 1 Jan 64, 25p.
Contract DA36 039AMC02350E, Task 1G6 22 001A058 01
Unclassified report

Descriptors: (*Quartz resonators, Reliability (Electronics)), (*Reliability (Electronics), Quartz resonators), Tests, Crystals, Oscillators, Temperature, Life expectancy, Stability, Resistance (Electrical), Frequency.

Most of the crystal units required for Phase I of the study were received. A portion of these have completed preproduction testing and are in the 5000 hour reliability test. The balance of the samples on hand are being subjected to the preproduction tests. Design and testing of oscillators for Phase II continues. (Author)

AD-432 967 Div. 8
OTS price $5.60

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
STRETCHING PULSES WITH THE LINK STRUCTURE,
by D. Mitchell. Jan 64, 53p. Rept. no. TR78
Contract DA36 039AMC00034e
Unclassified report

Descriptors: (*Networks, Pulse compression), (*Pulse compression, Networks), (*Coding, Pulse compression), Low-pass filters, Mathematical analysis, Synthesis, Phase shifters, Electrical properties, Gain, Electron tubes, Performance (Engineering), Delay lines.

A theoretical and experimental study of a pulse-stretching network using the link structure is presented. The Bessel filter has a good low-pass approximation to the ideal transmission line for use in the link structure. The realization of the Bessel filter is presented, and the impedance matching problems in the plate and grid lines are considered. A practical structure for a pulse-stretching network is formulated and used in taking photographs of a 5-ns input pulse and the resulting output pulse, whose tracings are presented in this paper. (Author)

AD-432 977 Div. 8, 30
OTS price $5.10

Columbia U. School of Engineering, New York.
ELECTRO-OPTICAL SIGNAL PROCESSING TECHNIQUES FOR PHASED ARRAY ANTENNAS.
Quarterly progress rept., 1 Oct-31 Dec 63,
by A. Aimette, M. Arm and L. Lambert. 1 Jan 64,
56p. Rept. no. P1 199
Contract AF49 638 1113, ARPA Order 279
Unclassified report

Descriptors: (*Antennas, Data processing systems), (*Electron optics, Spectrum analyzers), (*Spectrum analyzers, Antennas), (*Data processing systems, Antennas), Multiplex, Ultrasonic radiation, Light, Modulators, Lasers, Neon, Helium, Gases, High frequency, Diffraction, Simulation, Transducers, Delay lines.

The research program leading to the development of a signal processor for phased array antennas utilizing the time delay and spatial multiplexing techniques is reviewed. A summary of the basic one-dimensional spectrum analyzer theory is presented. An electro-optical spectrum analyzer which is the major component of the phased array processor is described. An experimental model containing a single channel ultrasonic light modulator and a helium-neon gas laser light source is used to determine system performance. For a 15-mc and a 20-mc signal excitation, the theoretical resolution width of 20 kc was obtained indicating a diffraction limited optical system. Experimental measurements of the scattered light level are also presented indicating that a system dynamic range of 40 db is feasible. The signal simulator, transducer drivers, and the 24-channel light modulator designed for the experimental spatially multiplexed system are also described. (Author)

AD-433 092 Div. 8, 26
OTS price $1.60

Sprague Electric Co., North Adams, Mass.
PRODUCTION ENGINEERING MEASURE FOR COLUMBIUM CAPACITORS.
Quarterly rept. no. 1, 26 June-26 Sep 63,

by J. H. D. Folster, E. E. Holley and A. Whitman.
26 Sep 63, 13p.
Contract DA36 039AMC01468E
Unclassified report

Descriptors: (*Capacitors, Niobium), (*Manufacturing methods, Capacitors), Oxygen, Oxides, Coatings, Electrolytes, Electric currents, Temperature, Manganese, Aging (Materials), Sintering, Vapor plating, Production.

A discussion is presented of the effort being made to obtain more capacitance from columbium pellets. Three approaches are being studied. The effect of the amount of oxygen present in a columbium pellet before anodization on the quality of the finished capacitor was investigated and found to be negligible. Another investigation revealed that a definite relationship exists between electrolyte composition and per cent dissipation factor and leakage current. Study also resulted in an optimum reanodization voltage for the 35 V rating, and it indicated a relationship between the composition of reanodization electrolyte and leakage current levels on finished capacitors. It was found that the present anodization temperature range and the present electrolyte rinse times are satisfactory. A new method of MnO2 deposition was developed. The reanodization tank was redesigned, and an improved aging facility was established. Seventeen experimental runs of 22 micron f-35 V capacitors have indicated a progressive lowering of leakage current and per cent dissipation factor levels. (Author)

AD-433 094 Div. 8
OTS price $2.60

Microwave Associates Inc., Burlington, Mass.
BROADBAND SOLID-STATE SWITCHES.
Quarterly rept. no. 2, 1 Oct 63-31 Dec 63
by R. Tenenholtz. 31 Dec 63, 30p.
Contract NObsr89463, Proj. SR0080302, Task 9604
Unclassified report

Descriptors: (*Electronic switches, Broadband), Diodes (Semiconductors), C band, L band, S band, X band, Design, Containers, Filters (Electromagnetic waves).

AD-433 098 Div. 8, 25
OTS price $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
PROPAGATION AND SCATTERING OF RADIO WAVES IN TURBULENT MAGNETO-IONIC MEDIA,
by Leonard S. Taylor. Mar 64, Rept. no. R64SD17
Unclassified report

Descriptors: (*Ionospheric propagation, Radio waves), (*Radio waves, Scattering), Plasma medium, Dielectric properties, Electron density, Electromagnetic waves, Electric field, Mathematical model, Whistlers.

The Ewald-Oseen Extinction Theorem is generalized to account for electromagnetic propagation in a turbulent magneto-ionic medium. Using the Born (single-scatter) approximation, the effective dielectric constant for the medium is determined. The scattered field is derived and a general expression for the decond-order term in the Born series is obtained. (Author)

AD-433 115 Div. 8, 26
OTS price $10.50

Lockheed Aircraft Corp., Sunnyvale, Calif.
PACKAGING MINIATURIZATION. CHARGE NUMBERS 31-8027-0201-01, 31-8027-0901 AND RES 2 AND 4,
by Shiro Abe, Stuart Churchon and H. L. Newman.
15 Sep 61, 137p. Rept. no. R5832 3 80 61 41
Unclassified report

Descriptors: (*Modules (Electronic), Manufacturing methods), (*Manufacturing methods, Modules (Electronic)), (*Switching circuits, Modules (Electronic)), Amplifiers, Power, Encapsulation, Transistors, Production, Resistors, Capacitors, Welding, Chemical milling, Miniature electronic equipment, Packaged circuits, Tables, Electrical properties, Performance (Engineering), Diodes (Semiconductor), Electric terminals, Soldering, Wiring diagrams, Printed circuits, Temperature, Configuration, Reliability (Electronics).

High Power Amplifier Para-Plate modules were built and functionally tested. A few prototype modules using Weld Pack and Chem-Mill techniques were constructed. Some prototype Para-Plate low power flip flops were assembled but not evaluated. Several other versions of the low power flip flop were investigated. This report describes the design work and includes illustrations and tables plus preliminary test results, layout artwork, drawings, encapsulation techniques, conclusions and recommendations. (Author)

AD-433 121 Div. 8 U
OTS price $1.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
STUDY AND INVESTIGATION OF MILLIMETER AND SUB-MILLIMETER WAVE RECEIVER TECHNIQUES,
Quarterly rept. no. 3, 1 Sep-31 Nov 63,
by M. D. Sirkis. Feb 64, 16p.
Contract AF30 602 3046, Proj. 4505, Task 450501
RADC TDR64 28 Unclassified report

Descriptors: (*Detectors, Millimeter waves), Transmission lines, Waveguides, Video signals, Sensitivity, Backward wave oscillators, Crystal detectors.

-The development of video detection techniques which are appropriate for the millimeter and submillimeter range of the spectrum are described. Wafers of TGS have been mounted in both RG 99/U and RG 139/U waveguides for tests of the pyroelectric effect detector. It is estimated that the detector, when mounted in RG 139/U waveguide, is capable of detecting a 104 micro watt signal at a wavelength of 0.845 mm. An error in calculation of the beam waveguide reflector shape has been corrected. Experimental results are only slightly affected by the change in the reflector shape. (Author)

AD-433 124 Div. 8, 15
OTS price $1.10

California U., Los Angeles.
A CONDITION FOR OPTIMALITY IN SEQUENTIAL SIGNAL DETECTION,
by K. B. Gray. Dec 63, 8p. Rept. no. WP46; RR88
Contract Nonr23373
Unclassified report

Descriptors: (*Signals, Detection), (*Detection, Optimization), (*Optimization, Sequential analysis), Noise, Sampling, Time, Probability, Decision-making, Errors, Conformal mapping, Statistical analysis, Statistical tests, Stochastic processes, Sequences.

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-433 128 Div. 8, 26
OTS price $7.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
WELDED ELECTRONICS DESIGN TECHNIQUES.
22 Nov 60, 71p. Rept. no. LMSD704041
Unclassified report

Descriptors: (*Modules (Electronic), Specifications), (*Welding, Modules (Electronic)), (*Manufacturing methods, Welding), Production, Encapsulation, Military requirements, Miniature electronic equipment, Jigs, Electric terminals, Reliability (Electronics), Materials, Performance (Engineering), Electric wire, Electric connectors, Physical properties, Heat transfer, Cooling, Tables.

This manual establishes the design requirements for welded electronic modular packaging and is intended to be used by all electronic design engineers and designers. The purpose of this manual is to standardize the design of welded electronic modular packages. (Author)

AD-433 172 Div. 8
OTS price $4.60

Electronic Defense Lab., Mountain View, Calif.
LOG PERIODIC DIPOLE ARRAY WITH PARASITIC ELEMENTS,
by Normand Barbano. 30 Jan 64, 42p. Technical Memorandum M623
Contract DA36 039AMC00088E
Unclassified report

Descriptors: (*Dipole antennas, Electrical properties), (*Electrical properties, Dipole antennas), Antenna configurations, Antenna feeds, Performance (Engineering), Antenna radiation patterns, Microwave frequency, Electrical impedance, High frequency.

The design and measured characteristics of dipole and monopole versions of a log periodic array with parasitic elements are discussed. In a dipole array with parasitic elements, these elements are used in place of every alternate dipole, thereby eliminating the need of a twisted feed arrangement for the elements to obtain log periodic performance of the anntenna. This design with parasitic elements lends itself to a monopole version of the antenna which has a simplified feeding configuration. The result is a log periodic antenna design that can be used from high frequencies through microwave frequencies. (Author)

AD-433 173 Div. 8
OTS price $5.60

Cornell U., School of Electrical Engineering, Ithaca, N. Y.
INVESTIGATION OF LINEAR BEAM AND NEW CONCEPTS OF MICROWAVE POWER GENERATION.
Quarterly progress rept. no. 1, 1 Oct-15 Dec 63,
by G. C. Dalman, L. F. Eastman, L. A. MacKenzie, P. R. McIsaac and T. Mihran. Feb 64, 57p.
Contract AF30 602 3243, Proj. 5573, Task 557303
RADC TDR63 555 Unclassified report

Descriptors: (*Electron beams, Microwaves), (*Pulse generators, Microwave frequency), (*Klystrons, Microwave frequency), (*Plasma medium, Electron beams), (*Lasers, Thermionic emission), Theory, Space charges, Microwave equipment, Propagation, Magnetic fields, Electron guns, Hydrogen, Microwave amplifiers, Photoelectric effect.

This report is divided into five separate tasks. Study of Basic Beam Phenomena studies were conducted on the r-f propagation along a d-c scalloped beam, and progress was made on the development of equipment for measuring r-f propagation along confined-flow electron beams in varying magnetic fields and the growth of noise in scalloped and nonscalloped Brillouin beams. ''Beam-Circuit Interaction,'' analytical work was performed with the aid of an electronic computer on the large-signal properties of two-cavity klystrons and on the properties of biased two-cavity klystrons. Experimental work, along the same line as Hefni, was started on an external cavity klystron, and periodic microwave interaction studies were also begun. ''Nanosecond Pulse Study,'' in which experimental work on the response of klystrons to nanosecond r-f pulses and theoretical studies using nonlinear space-charge wave analysis were carried out. ''Interaction of a High-Power Electron Beam and a Plasma,'' work was conducted on the generation and diagnosis of a hydrogen plasma, on plasma-amplifier gain, on direct coupling mechanisms, and on electron beam stability. (Author)

AD-433 255 Div. 8, 7
OTS price $2.60

ITT-Surprenant Mfg. Co., Clinton, Mass.
DEVELOPMENT OF FIELD DATA CABLE.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 63,
by G. T. Leary. 31 Dec 63, 29p.
Contract DA36 039AMC03337E
Unclassified report

Descriptors: (*Coaxial cables, Design), Copper, Silver, Metal coatings, Specifications, Electric insulation, Polyethylene plastics, Attenuation, Mechanical properties.

The use of litz conductors does not improve pulse transmission conditions and the use of such is conclusively not warranted. Data compiled in this report show that a construction of a coaxial component utilizing a conductor of 19/34 S.C. or 19/34 T. C. substantially improves the transmission characteristics. Although a cable having a conductor of nineteen strands of 34 AWG Alloy 63 with a silver plate was not constructed and investigated during this interval it is believed that if constructed the transmission qualities will approximately be equal to that of S.C. or tinned copper and at the same time show a marked improvement mechanically. Any mechanical improvement will be advantageous when testing to MILC-13777. (Author)

AD-433 270 Div. 8
OTS price $2.60

Weston Instruments Div. Daystrom Inc., Newark, N. J.
A POROUS SUBSTRATE RESISTOR AIMED AT MINIATURIZATION OF METAL-FILM RESISTORS.
Interim development rept. no. 6, 1 June-1 Mar 64,
by T. Matley and R. E. Busch. 1 Mar 64, 22p.
Contract NObsr87542, Proj. SR0080303.
Unclassified report

Descriptors: (*Resistors, Metal films), Porous materials, Resistors), Miniature electronic equipment, Microminiaturization (Electronics), Aluminum compounds, Oxides, Ceramic materials, Copper, Brazing.

Ceramics with higher thermal conductivity than quartz were investigated. Specifically, alumina was reconsidered for substrate use because of

thermal conductivity, availability and cost. Defects in the substrate structure (fused areas, vacancies and non-intercommunication of pores) were analyzed with respect to the parameters of weight-to volume ratio and flow. Results show no significant improvement in structure. Individual brazing of the end cap to the substrate replaced strip brazing used previously. The new method eliminated the need for deburring and refluxing and was superior in strength. The end cap was redesigned to permit the mechanical adjustment of the four surfaces of the substrate and solution penetration was enhanced. (Author)

AD-433 287 Div. 8
OTS price $8.10

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
OPTIMIZATION OF POLE SENSITIVITY IN ACTIVE RC NETWORKS,
by N. M. Herbst. 15 Dec 63, 89p. Research rept. no. EE569; TR77
Contract DA36 039AMC00034E
Unclassified report

Descriptors: (*Networks, Sensitivity), (*Sensitivity, Networks), (*Electrical properties, Networks), Resistors, Capacitors, Mathematical analysis, Electric filters, Analysis, Gain, Performance (Engineering).

The sensitivity of active RC networks with respect to variations in the gain of active elements is studied by means of the zeros of the pole-sensitivity function. It is demonstrated that the zeros of sensitivity indicate the effect of the polynomial decomposition of a synthesis procedure upon the pole sensitivity. Methods of realizing network functions with prescribed decompositions are discussed, and several specific networks are given. Reduction of the pole sensitivity by control of the zeros of sensitivity is carried out by means of a digital computer. For quadratic functions, a zero of sensitivity can always be obtained at a real frequency, giving a sensitivity characteristic with a minimax optimum. It is shown desirable to realize high-order filters as a cascade of second-order 'pole-pair' units. The pole-pair cascade using the optimum desensitivity decomposition is optimal when the gain variations are independent, whereas for high-order filters, the sensitivity reductions possible from improving the decompositions are limited. In addition, strong practical considerations favor the cascade connection. (Author)

9. FLUID MECHANICS

AD-431 202 Div. 9
OTS price $2.75

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR HYPERSONIC FLOWS OVER EXPANSION CORNERS AND AHEAD OF RAMPS. PART III: MACH 8 PRESSURE DATA FOR FLOWS AHEAD OF RAMPS PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS.
by Louis G. Kaufman II. Dec 63, 140p.
Contract AF33 616 8130, Proj. 8219, Task 821902
ASD TDR63 679, pt. 3 Unclassified report

Descriptors: (*Wedges, Heat transfer), (*Hypersonic flow, Separation), (*Pressure), Flat plate models, Model tests, Wind tunnel models, Flaps, Aerodynamic configurations, Instrumentation, Reynolds number, Measurement, Control, Delta wings.

Pressure and heat transfer data were obtained for hypersonic flows over 40-degree expansion corners and ahead of ramps. Full and partial span ramps, having wedge angles up to 90 degrees, were tested at two locations on a sharp leading edge flat plate, with and without end plates. Pressure data were obtained for Mach 5 for model length Reynolds numbers between 1.1 and 6.6 million. Both pressure and heat transfer data were obtained for Mach 8 for Reynolds numbers between 1.1 and 3.3 million. (Author)

AD-431 228 Div. 9
OTS price $5.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
A MODEL FOR THE TRANSITION REGIME IN HYPERSONIC RAREFIED GAS DYNAMICS,
by B. B. Hamel. Oct 63, 55p. Rept. no. R63SD85
Contract AF04 694 222
Unclassified report

Presented at the AIAA Conference on Physics of Entry into Planetary Atmospheres held 26-28 Aug 63 at The Massachusetts Institute of Technology.

Descriptors: (*Superaerodynamics, Hypersonic flow), (*Hypersonic flow, Superaerodymanics), Partial differential equations, Mathematical models, Statistical functions, Transport properties, Molecules, Shock waves, Fluid dynamic properties, One-dimensional flow, Compressible flow, Transition.

A new, two-fluid model is presented for the hypervelocity rarefied regime. A set of partial differential moment equations is presented; they are of the same order of difficulty as the conventional gas dynamic equations. Those particles reflected from the surface of the body are considered as the wall fluid, while all scattered and free-stream particles comprise the cold fluid; the assumption being that collisions between wall and cold particles convert wall particles to cold particles. Kinetic models are then constructed for both fluids. To obtain expressions for the absorption and emission terms in the model, the distribution function of each fluid is represented by an expansion in the derivatives of the delta function and the relevant integrations are performed. Although the model does not provide a description of the entire transition between free molecule flow and a fully developed shock wave, the results obtained for the piston problem do give insight into the shock formation

AD-431 275 Div. 9
OTS price $19.75

North American Aviation, Inc., Columbus, Ohio.
DEVELOPMENT OF AERO-THERMODYNAMIC PROCEDURES FOR DESIGNING HIGH SPEED VEHICLE LEADING EDGES,
by J. K. McCullough. 1963, 309p. Rept. no. NA63H982
Contract NOw61 0719t
Unclassified report

Descriptors: (*Aerodynamic heating, Leading edge), (*Delta wings, Aerodynamic heating), Drag, Supersonic characteristics, Hypersonic characteristics, Aircraft, Guided missiles, Boost-glide vehicles, Shock waves, Heat transfer, Conical bodies, Wedges, Blunt bodies, Design, Temperature, Distribution, Swept-back wings, Aerodynamic configurations.

Aerodynamic and thermodynamic procedures were developed for analyzing and designing heat-sustaining leading edges and forebodies of high-speed aircraft and missiles. A series of design charts is presented for symmetrical, blunted wedge, and conical leading edges that enable the user to predict steady state surface temperature distributions of radiation-cooled nose sections while considering aerodynamic drag. The methods and design charts apply to flight speeds between Mach 2 and Mach 24, and altitudes between sea level and 220,000 feet. In addition, a sample structural analysis was conducted for two different leading edge shapes of a swept wing being maintained at a flight condition of Mach 3.5 at 80,000 feet altitude. The results apply to aircraft, missiles and glide reentry vehicles operating under quasi-steady flight conditions. (Author)

AD-431 277 Div. 9, 15
OTS price $3.60

Mississippi State U., State College.
A COMPARISON OF METHODS FOR COMPUTING THE VELOCITY DISTRIBUTION AND THE BOUNDARY LAYER ON BODIES OF REVOLUTION.
Nov 63, 34p.
Contract DA44 177AMC892T, Task 1D121401A14203
ATRECOM TR63 47 Unclassified report

Descriptors: (*Boundary layer, Incompressible flow), (*Aerodynamic properties, Bodies of revolution), (*Bodies of revolution, Fluid flow), Fluid flow, Fluid mechanics, Boundary layer problems, Numerical analysis, Partial differential equations, Velocity, Laminar flow, Turbulence, Turbulent boundary layer, Two-dimensional flow, Laminar boundary layer, Boundary layer transition.

This report represents an analytical and experimental study into the solution of flow around a body of revolution. The flow outside the boundary layer was assumed to be a perfect fluid and was explored by potential flow methods. The flow inside the boundary layer was explored by boundary layer methods admitting the predominance of viscosity. The potential flow methods include von Karman's method, used as a representative of the singularity distribution, and Kaplan's, which is regarded as being one of the more accurate methods. In connection with Kaplan's method, Young's method, which is a modification of Kaplan's method, is also discussed. In addition to these and for comparison, the two-dimensional case is also chosen. For ease of calculation, spheroids of various fineness ratios are used. Especial emphasis is put on the spheroid of fineness ratio 0.3 as the representative of the spheroid. A calculation method for both the laminar and turbulent flow, Truckenbrodt's method, is

chosen as the representative method for calculation of the turbulent boundary layer. For comparison, other methods are given. (Author)

AD-431 280 Div. 9
OTS price $7.60

Gruman Aircraft Engineering Corp., Bethpage, N. Y.
PRESSURE MEASUREMENTS FOR MACH 8 FLOWS OVER EXPANSION CORNERS AND RAMPS ON AN INTERNALLY COOLED MODEL. PART I. EXPANSION CORNER FLOWS. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS,
by Louis G. Kaufman, II. Oct 63, 73p.
Contract AF36 616 8130, Proj. 8219 Task 821902
RTD TDR63 4044 pt. 1 Unclassified report

Descriptors: (*Hypersonic test vehicles, Hypersonic characteristics), (*Aerodynamic control surfaces, Hypersonic flow), Exhaust fairings, Hypersonic flow, Aerodynamic characteristics, Pressure, Heat transfer, Wedges, Hypersonic wind tunnels.

Pressure distributions were obtained for Mach 8 flows over a sharp 40 degree expansion corner and ahead of ramps on an internally cooled model. Full and partial span ramps, having wedge angles up to 30 degrees, were tested at model angles of attack from -45 to +10 degrees for Reynolds numbers ranging from 1.1 to 3.3 million. The model wall temperature was maintained at fairly constant levels ranging from 450 to 1150 degrees Rankine. (Author)

AD-431 286 Div. 9
OTS price $8.60

Aerospace Information Division, Washington, D. C.
SUPERSONIC AND HYPERSONIC FLOW. ANNOTATED BIBLIOGRAPHY OF SOVIET LITERATURE.
21 Jan 64, 93p.
AID B64 3, 1 Unclassified report

Descriptors: (*Hypersonic flow, Bibliographies), (*Supersonic flow, Bibliographies), (*Aerodynamic configurations, Fluid flow), Boundary layer, Boundary layer problems, Shock waves, Turbulence, Nozzles, Diffusers, Wind tunnels, Blunt bodies, Wedges, Spikes, Ablation, Heat transfer, Compressible flow, Gas flow, Slender bodies, Disks, Structural shells, Bodies of revolution, Lift, Drag, Geometric forms, Curved profiles, Cylindrical bodies.

This report is divided into three main sections: Aerodynamics, Gasdynamics, and General Flow Phenomena. An attempt is made in the first section to cover dynamic phenomena associated with the high-velocity flow of gases over bodies, including rarefied and free-molecular flow. The second section covers the problems associated with internal flow, e. g., flow in nozzles, wind tunnels, and shock tubes. Similarity concepts are also included in this section. The third section deals with general flow phenomena at supersonic and hypersonic velocities. (Author)

AD-431 303 Div. 9, 15, 14
OTS price $4.60

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
ON LARGE DYNAMIC DEFORMATIONS OF GENERAL SHELLS,
by Theodore H. H. Pian. Jan 64, 43p. Technical rept. no. 110 1
Contract AF33 657 8427, Proj. 6906, Task 690901
RTD TDR63 4271 Unclassified report

Report on nuclear weapon effect on space vehicles.

Descriptors: (*Structural shells, Deformation), Tensor analysis, Elastic shells, Plasticity, Elasticity, Stresses, Fluid flow, Partial differential equations, Loading (Mechanics), Beams (Structural), Rings, Cylindrical bodies, Disks, Blast, Buckling, Shock waves, Spheres, Hemispherical shells, Curved profiles, Plastics, Elastomers, Difference equations, Creep.

Equations are devised for the solution of large dynamic response of general three-dimensional shells of elastic-plastic materials. The equations are written in tensor form. The equivalent finite-difference expressions for the various quantities are presented. It is shown that the solution of the general shell problem involves exactly the same basic steps as that for two-dimensional structures. (Author)

AD-431 304 Div. 9, 30
OTS price $5.60

Republic Aviation Corp., Farmingdale, N. Y.
RESEARCH INVESTIGATION OF HYDRAULIC PULSATION CONCEPTS,
Quarterly progress rept. no. 4, 1 Dec 63-29 Feb 64.
29 Feb 64, 59p. Rept. no. 933 4
Contract AF33 657 10622, Proj. 8128, Task 812807
Unclassified report

Descriptors: (*Hydraulic systems, Pulse transmitters), Transformers, Hydraulic models, Fluid dynamic properties, Fluids, Cavitation, Diaphragms (Mechanical), Pulse generators, Rectifiers, Valves, Pulse communication systems.

System efficiency and transmission line loss methods were derived. Experimental system efficiency and line loss data were secured from the miniaturized system. Designs of a diaphragm-and mechanical-type transformer were studied. System failure and functional effect analyses were made. Also, a preliminary glossary of terms peculiar to pulsating hydraulics was compiled. (Author)

AD-431 307 Div. 9, 30
OTS price $2.60

Mississippi State U., State College.
IMPERVIOUS TURBULENT BOUNDARY LAYER MEASUREMENTS USING AN INTEGRATING BOUNDARY LAYER MOUSE.
Nov 63, 30p. Rept. no. RN17
Contract DA44 177AMC892T, Task 1D121401A14203
ATRECOM TR63 70 Unclassified report

Descriptors: (*Boundary layer, Measurement), (*Turbulent boundary layer, Data processing), Stresses, Shear stresses, Mathematical models, Incompressible flow, Turbulence.

The composite boundary layer mouse is an alternative method to the boundary layer velocity profile technique of determining all the pertinent parameters of a turbulent boundary layer. The accuracy of the system in comparison with the profile method was well within experimental tolerances usual with the measurement of boundary layer velocity profiles. The use of the composite system simplified the data reduction which could be performed by any computer, reduced the data reduction time, and thereby appreciably speeded up the entire boundary layer research program. (Author)

AD-431 533 Div. 9
OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE INFLUENCE OF SLIGHT LEADING-EDGE BLUNTNESS ON BOUNDARY-LAYER TRANSITION AT A MACH NUMBER OF EIGHT,

by Jack D. Whitfield and J. Leith Potter.
Mar 64, 28p.
Contract AF40 600 1000, Proj. VB2943, Task 895303
AEDC TDR64 18 Unclassified report

Descriptors: (*Boundary layer transitions, Hypersonic flow), (*Aerodynamic control surfaces, Hypersonic characteristics), Leading edge, Cylindrical bodies, Model tests, Wings, Fins, Reynolds number, Theory, Blunt bodies, Aerodynamic configurations.

The influence of leading-edge geometry on boundary-layer transition on a hollow cylinder aligned with the flow was studied under hypersonic conditions with near adiabatic wall temperature. Effects on the Reynolds number of boundary-layer transition produced by varying free-stream unit Reynolds number and small degrees of leading-edge bluntness are shown to be qualitatively similar to results previously reported by the authors for Mach numbers of 3 to 5. There was a pronounced favorable effect associated with increases in both factors. Comparisons are made with the theoretical estimates of the influence of bluntness given by Moeckel. Although qualitative agreement with Moeckel's theory is noted, quantitative agreement is not shown and some doubt concerning the theory is expressed. (Author)

AD-431 568 Div. 9, 25
OTS price $21.00

Naval Ordnance Lab., White Oak, Md.
TRANSIENT AND SINUSOIDAL THERMAL DIFFUSION, CONVECTION, AND RELATED INFRASONIC PRESSURE CHANGES IN ENCLOSED FLUIDS.
by H. Gerber. 1 Oct 63, 376p.
NOL TR62 94 Unclassified report

Descriptors: (*Heat transfer, Fluid dynamic properties), (*Fluids, Subsonic characteristics), Thermal diffusion, Convection, Pressure, Detectors, Pressure gages, Gases, Acoustic impedance, Frequency, Pressure vessels, Propagation, Mathematical analysis, Sensitivity, Experimental data.

Analytical methods are presented for calculating the precise magnitude of small pressure changes at infrasonic frequencies in enclosed fluids. Calculated results are tabulated and supplemented by experimental data. The information which is presented can be used for the rapid design of infrasonic instrumentation by mathematical methods. (Author)

AD-431 773 Div. 9
OTS price $7.60

Institute of Engineering Research, U. of Calif., Berkeley.
DRAG OF A TWO-DIMENSIONAL STRIP NORMAL TO HYPERSONIC NEAR FREE MOLECULE FLOW,
by Denny Ru-sue Ko. 30 Jan 64, 73p. Rept. no. AS64 4
Contract Nonr22245
Unclassified report

Descriptors: (*Hypersonic flow, Drag), (*Fluid dynamic properties, Hypersonic flow), Fluid flow, Heat transfer, Hypersonic wind tunnels, Hypersonic nozzles, Calibration.

Drag coefficients for two-dimensional strips normal to the flow have been determined experimentally at Mach numbers of 6.22, 8.12, and 10.09 by means of the free-jet testing technique. The free stream Knudsen number ranges from about 1 to 30. Results obtained are compared to the nearly free-molecule flow theory proposed by Willis. A number of special tests were performed to demonstrate the validity of the free-jet experimental technique and to determine the feasibility of further application of this valuable testing method. (Author)

AD-431 778 Div. 9, 22
OTS price $2.50

IIT Research Inst., Chicago, Ill.
WATER WAVES FROM SURFACE AND SHALLOW UNDERWATER BURSTS.
Final rept.,
by J. E. Ash and T. V. Eichler. 31 Jan 64, 108p. Rept. no. T6038
Contract Nonr366300
Unclassified report

Descriptors: (*Underwater explosions, Water waves), (*Water waves, Underwater explosions), Surface burst, Differential equations, Boundary value problems, Numerical analysis, Hydrodynamics, Digital computers, Programming (Computers), Mathematical models, Pressure.

This report describes the theoretical development of a hydrodynamic computer code for the computation of the initial state of the water following a surface of shallow underwater explosion, and the subsequent response of the water for a limited time period later. The state of the water comprises the velocity, pressure, and energy distributions. The results of the computation provide a measure of the efficiency of the explosion in terms of the fraction of the mechanical explosive energy imparted to the water, and permit a prediction of the resulting surface wave shapes. The computation involves solving by an iterative numerical scheme, a set of Poisson-type partial differential equations with appropriate boundary conditions. Convergence criteria were established by numerical experimentation on the computer and by comparison with high-speed motion picture data obtained in small-scale underwater explosion tests. (Author)

AD-431 844 Div. 9
OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
GENERAL RESEARCH, CONFINED VORTEX FLOWS WITH BOUNDARY-LAYER INTERACTION.
by M. L. Rosenzweig, W. S. Lewllen, and D. H. Ross. 20 Feb 64, 58 p. Rept. no. ATN64 9227 2
Unclassified report

Descriptors: (*Fluid flow, Vortices), Axially symmetric flow, Hilsch tubes, Boundary layer, Velocity, Viscosity, Boundary layer transition, Turbulance, Mathematical analysis, Interference.

Axisymmetric flow of an incompressible fluid in a right-cylindrical vortex tube bounded by planar end walls is considered. The mutual interaction of the primary vortex flow field and the end-wall boundary layers is studied by relating the stream function and circulation in these regions. An interaction parameter is defined which determines the magnitude of the influence of the boundary layers on the circulation and mass-flow distributions in the primary flow. These distributions are obtained numerically, primarily as functions of the interaction parameter and the Reynolds, number based on the radial flow. Experimental results are interpreted in the light of this theory, and it is concluded that substantial turbulence levels (though somewhat less than estimates made without consideration of boundary layer effects) must be assumed to explain the experimental results. (Author)

AD-431 848 Div. 9
OTS price $8.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EQUATIONS AND CHARTS FOR THE EVALUATION OF THE HYPERSONIC AERODYNAMIC CHARACTERISTICS OF LIFTING CONFIGURATIONS BY THE NEWTONIAN THEORY,
by E. L. Clark and L. L. Trimmer. Mar 64, 92p.
Contract AF40 600 1000, Proj. VT8002
AEDC TDR64 25 Unclassified report

Descriptors: (*Delta wings, Hypersonic characteristics), (*Wing-body configurations, Hypersonic characteristics), Angle of attack, Wedges, Equations, Lift, Data, Theory, Mathematical analysis, Boost-glide vehicles, Stability, Pressure, Distribution, Mathematical prediction.

The pressure distribution predicted by the modified Newtonian theory is used to develop equations for the aerodynamic forces, moments, and stability derivatives for components of hypersonic lifting configurations. In conjunction with the equations, a set of charts is presented to enable simple determination of the aerodynamic characteristics of swept cylinders, swept wedges, spherical segments, and cone frustums at zero sideslip and angles of attack from 0 to 180 degrees. This method allows evaluation of most delta wing-body combinations without the need for numerical or graphical integration. As an example of the procedure, the theoretical characteristics of a blunt 75-degree swept delta wing are calculated and compared with experimental results. (Author)

AD-431 862 Div. 9
OTS price $12.50

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
FLOW TABLES FOR AIR (GAMMA = 1.4) PASSING AN ABRUPT AREA INCREASE OBLIQUE TO THE FLOW DIRECTION,
by Arthur J. Wennerstrom. Jan 64, 175p.
Proj. 7065, Task 706501
ARL 64 10 Unclassified report

Report on Fluid Dynamics Facilities Research.

Descriptors: (*Adiabatic gas flow, Tables), Air, Diffusion, Aerodynamic control surfaces, Equations of state, Equations, Thermodynamics, Vortices, Energy, Gas flow.

Tabulated values are presented for the flow conditions before and after a step increase in area oblique to the flow direction. This condition may arise with a swirl flow in an annulus, or flow between parallel planes which extend to infinity in the direction parallel to the step. The tables apply to a compressible fluid with a specific-heat ratio of 1.4. The flow is assumed adiabatic and without wall friction. Downstream conditions apply at a location sufficiently far downstream such that uniform flow has been reestablished. Input variables considered are area ratio, Mach number component normal to the abrupt area change, and the angle between the flow direction and the normal. Calculated quantities are the absolute up-and downstream Mach numbers, the angle between downstream flow and the normal, static pressure ratio, and total pressure ratio. The method of calculation is described. (Author)

AD-431 919 Div. 9
OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THE INVISCID REACTING FLOW FIELD ABOUT HYPERSONIC BODIES,
by V. A. Langelo. Dec 63, 38p. Rept. no. R63SD90
Contract AF04 694 222
Unclassified report

Descriptors: (*Axially symmetric flow, Hypersonic flow), Gas flow, Pressure, Shock waves, Supersonic flow, Aerodynamic characteristics, Electron density.

A method for the determination of the flqw field about any axially symmetric body shape for any conditions of hypersonic flow is described. The method involves the combination of streamtubes in the field and obtains a solution of the complete field by an iteration process starting with initial guesses for the body pressure distribution and the shock shape and location. This technique has been successfully applied to the solution of the flow field about axially symmetric bodies with ideal or equilibrium gases including bodies with slope discontinuities where no secondary shocks exist in flow. The complete flow field solution is obtained given only the body shape and size and the free stream conditions. The results of a flow field about a spherically blunted cone are presented for M = 20, h = 200,000 ft. altitude using an 11 species, 13 reaction model of air. Comparison is made with the equilibrium air solution for the same conditions. (Author)

AD-431 923 Div. 9, 14
OTS price $5.60

Stanford U., Calif.
HEAT TRANSFER AND FLOW FRICTION CHARACTERISTICS OF SKEWED PASSAGE AND GLASS-CERAMIC HEAT TRANSFER SURFACES,
by C. P. Howard. Oct 63, 52p. Rept. no. TR59
Contract Nonr225 23, Proj. NR090 342
Unclassified report

Descriptors: (*Heat exchangers, Ceramic materials), (*Gas turbine regenerators, Heat transfer), Glass, Friction, Surface properties, Reynolds number, Thermal conductivity.

Experimental results for convective heat transfer and flow friction characteristics of three skewed passage and four glass-ceramic compact heat exchanger surfaces are presented which should be of practical use, particularly in the design of gas turbine regenerators. The heat transfer data were obtained by the transient technique. (Author)

AD-432 044 Div. 9
OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
OPPOSED ANVIL BASIC DESIGN CONSIDERATIONS,
by R. E. Riecker. Dec 63, 32p.
Proj. 8652
AFCRL 63 941, IGA33 Unclassified report

Descriptors: (*Hydrostatic pressure, Instrumentation), (*High-pressure compressors, Design), High-pressure research, Design.

Optimum design of opposed anvils depends on analysis of stress distribution, geometry, and material strength as well as on such exceptional considerations as limitations imposed by apparatus application. Thirty years of reviewed experience using opposed anvils suggests that 6 percent cobalt-bonded tungsten-carbide inserts shrunk-fit into high-strength heat-treated binding rings yield best results if low cone angles (4 degrees to 6 degrees), slight insert tapers (1 degree), moderate interference (0.75 percent on the diameter), and moderate heat treatments are used. Sample pressures as high as 400 kb are possible for low temperatures whereas pressures of 50 kb and 1000 C may be developed routinely in well designed

opposed anvils. Bridgman-type opposed anvils used in a 50-kb 1000 C shear press developed at AFCRL incorporate Carmet CA3 6 percent cobalt-bonded tungsten-carbide inserts and Vascojet 1000 CVM forging binding rings with cone tapers of 15 degrees, side tapers of 1 degree, and interferences of 0.5 percent on the diameter. Maximum temperatures require Kennametal Kentanium K162 B inserts. Accompanying tables indicate physical properties for typical insert and binding ring materials. (Author)

AD-432 065 Div. 9, 15
OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
UNSTEADY BOUNDARY LAYER THEORY,
by V. V. Struminskiy. 13 Jan 64, 44p.
FTD TT63 778 Unclassified report

Trans. from Sbornik Teoreticheskikh Rabot Po Aerodinamika, pp. 230-252, 1957.

Descriptors: (*Boundary layer, Numerical analysis), Cylindrical bodies, Aerodynamic configurations, Partial differential equations, Bodies of revolution, Disks, Flat plate models, Geometric forms, Aerodynamic characteristics, Fluid dynamic properties, Laminar boundary layer, Turbulent boundary layer.

A general theory is developed for an unsteady boundary layer on cylindrical bodies of arbitrary cross section and on solids of revolution. A generalization of the basic integral methods of calculating a stationary boundary layer for the case of an arbitrary unsteady boundary layer is given. A new integral method of calculating the boundary layer is developed which more fully takes into account the features of unsteady processes. An exact solution of the equations of an unsteady boundary layer was found for a flat plate. The relationships between the characteristics of an unsteady boundary layer and the relative velocity in the case of unsteady fluid motion is obtained. A positive relative acceleration fosters separationless flow around the wing, while a negative relative acceleration promotes flow separation. The variable value of the relative acceleration leads to variable separation of the vortices from the wing surface. On the basis of the general relationships obtained in this study the effect of unsteady motion of an aircraft on its aerodynamic characteristics is determined qualitatively. (Author)

AD-432 128 Div. 9
OTS price $2.60

Mississippi State U., State College.
IMPERVIOUS TURBULENT BOUNDARY LAYER MEASUREMENTS USING AN INTEGRATING BOUNDARY LAYER MOUSE.
Nov 63, 25p. Rept. no. ARN17
Contract DA44 177AMC892T, Task 1D121401A14203
ATRECOM TR63 70 Unclassified report

Descriptors: (*Turbulent boundary layer, Instrumentation), Velocity, Airspeed indicators, Manometers, Measurement.

The composite boundary layer mouse was found to be a very accurate and convenient instrument to use in flight experiments to determine turbulent boundary layer parameters on an impervious surface and could be used in wind tunnel testing. It would be necessary to decrease the height of the integrating rake to increase the sensitivity for the thin boundary layers associated with small wind tunnel experiments. The accuracy of the system in comparison with the profile method was within the experimental tolerances usual with the measurement of boundary layer velocity profiles. The skin friction results obtained using the Preston shear meter were not so accurate, but this deficiency could be overcome by using the Ludweig and Tillmann shear relationship. Use of the composite system simplified data reduction which could be performed by any computer, reduced the data reduction time, and thereby appreciably speeded up the entire research program. As a large number of turbulent boundary layer theories attempt to predict the mean velocity profile of a turbulent layer, and as these theories must be verified, the composite integrating mouse which cannot perform this task can never completely replace velocity profile measuring systems. Nevertheless, it can be used as a powerful tool in boundary layer research. (Author)

AD-432 129 Div. 9, 15, 25
OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
GENERAL RESEARCH. MOMENTUM-INTEGRAL SOLUTIONS FOR THE LAMINAR BOUNDARY LAYER ON A FINITE DISK IN A ROTATING FLOW,
by W. S. King. 18 June 63, 51p. Rept. no. ATN63 9227 3
Unclassified report

Descriptors: (*Laminar boundary layer, Numerical analysis), Rotation, Disks, Fluid flow, Incompressible flow, Integrals, Series, Vortices, Turbulent boundary layer, Taylor's series, Three dimensional flow, Jets, Compressible flow, Partial differential equation, Nuclear reactors, Magnetohydrodynamics.

The laminar boundary layer produced by the rotating flow of a viscous incompressible fluid over a finite stationary disk is considered. The boundary-layer equations for flows in which the external tangential velocity varies as some power of the radius and the external radial velocity is zero are solved using several variations of the Karman-Pohlhausen momentum-integral method. The results of numerical integration of the boundary-layer equations are compared to the momentum-integral solutions of Taylor and Cooke and the series solution of Mack. A numerical error in Cooke's original solution is corrected and a new solution presented; the results do not change substantially. If the outer flow is a potential vortex ($n = -1$), the methods investigated yield widely varying results for radial inflow and the axial velocity distribution in the boundary layer; the simplest integral method employed agrees best with the series solution. For $n = -0.75$ and -0.5, all methods (except Cooke) yield results in close agreement with each other. The restrictions imposed by the various methods are discussed. It is noted that the tangential momentum equation controls the nature of the radial inflow. For $n = -1$, the introduction of a third scaling parameter may lead to erroneous results. (Author)

AD-432 130 Div. 9
OTS price $4.60

General Electric Co., Schenectady, N. Y.
RAREFIED HIGH-TEMPERATURE, ULTRAHIGH MACH NUMBER SLIP FLOW OVER A SHARP FLAT PLATE,
by H. T. Nagamatsu, R. E. Sheer, Jr. and J. A. Weil. Apr 63, 39p. Rept. no. 63RL3285C
Unclassified report

Descriptors: (*Hypersonic flow, High temperature research), (*Boundary layer, Gas flow), Heat transfer, Hypersonic wind tunnels, Schlieren photography, Metal plates, Heat transfer coefficients, Shock waves, Fluid dynamic properties, Stagnation point, Flat plate models.

An investigation was conducted in a hypersonic shock tunnel to determine the induced pressures and the local heat transfer rates for a flat plate with sharp leading edge. The free stream Mach number range was 7.95 to 25.1 with stagnation temperatures of approximately 2300 and 7000 R. For these temperatures and Mach number conditions, the strong interaction parameter, varied from 2.35 to 826 and the corresponding Knudsen numbers, based on the ratio of the free stream mean free path and the leading edge thickness, varied from 0.4 to 86. For free stream Mach numbers greater than 10, Knudsen numbers of approximately unity, and perfect gas conditions, the observed experimental induced pressures varied as the square root of the strong interaction parameter and the local heat transfer rates varied as the cube root of the strong interaction parameter to the fourth power as predicted by the noninsulated flat plate theory of Li and Nagamatsu. When the Knudsen number and the Mach number are much greater than 1, the leading edge slip phenomenon drastically reduced both the induced pressures and local heat transfer rates as compared to the theoretical values predicted with no slip at the surface. Schlieren photographs indicate the presence of slip flow at the sharp leading edge in that the formation of the strong shock wave and the boundary layer was delayed. (Author)

AD-432 135 Div. 9
OTS price $2.60

North American Aviation, Inc., Downey, Calif.
BOUNDARY LAYER TRANSITION--FREE-STREAM TURBULENCE AND PRESSURE GRADIENT EFFECTS,
by E. R. van Driest and C. B. Blumer. Apr 63, 21p. Rept. no. SID63 390
Contract AF49 638 1178, Proj. 9781 01
Unclassified report

Descriptors: (*Boundary layer transition, Theory), Laminar flow, Vortices, Shear stresses, Turbulence, Pressure, Laminar boundary layer, Thickness, Mathematical analysis, Compressible flow.

A theory of boundary layer transition is presented which includes the effects of free-stream turbulence and pressure gradient. The basic notion underlying the development concerns the remoteness of the boundary layer vorticity from the surface. The theory agrees well with experimental data. The laminar boundary layer solutions of Pohlhausen and Falkner-Skan are used to calculate the effect of pressure gradient on transition. Engineering formulas are presented and one example is calculated showing the application of the theory to a body of revolution. The theory can also indicate the effects of Mach number and heat transfer. (Author)

AD-432 196 Div. 9
OTS price $11.00

Harvard U. Div. of Engineering and Applied Physics, Cambridge, Mass.
THE VISCOUS INCOMPRESSIBLE FLOW INSIDE A CONE,
by Robert C. Ackerberg. Dec 62, 143p.
Contract Nonr186634
Unclassified report

Descriptors: (*Incompressible flow, Conical bodies), Axially symmetric flow, Vortices, Boundary layer, Equations, Motion, Tables, Mathematical analysis, Partial differential equations, Theory, Viscosity.

AD-432 218 Div. 9
OTS price $3.60

University of Southern Calif. Engineering Center, Los Angeles.
WIND TUNNEL TESTS AT SUPERSONIC MACH NUMBERS TO DETERMINE HEAT-TRANSFER COEFFICIENTS IN THE SHOCK WAVE-BOUNDARY LAYER INTERACTION REGION ON A PLANE SURFACE,
by Lawrence R. Kelley. 27 Dec 62, 31p. Rept. no. 65 41
Unclassified report

Descriptors: (*Flat plate models, Heat transfer coefficients), (*Aerodynamic heating, Flat plate models), Shock waves, Supersonic characteristics, Boundary layer transitions, Model tests, Instrumentation, Reynolds number.

The objective was to provide experimentally-determined heat transfer coefficients on a flat-plate model to find a correlation between the heat transfer coefficients in the shock wave-boundary layer interaction zone and such quantities as the effective Reynolds number, the free stream Mach number, and the strength of the wave. The tests were conducted at Mach 3.0 and 5.0 in two different wind tunnel circuits. The Mach 3.0 tests were performed using the Mach 3-4 variable-geometry nozzle, while the Mach 5.0 tests were performed with the Mach 4-6 variable-geometry nozzle. Both of these wind tunnel circuits have test sections approximately 21.5 inches square. Heat transfer coefficients at several stations were determined by measuring the amount of electrical power input required by nickel-chrome heating elements to maintain a given equilibrium temperature on the elements. The measurement was made for three or four different equilibrium temperatures, and the rate of change of power input with respect to the equilibrium temperature was then used to represent the heat transfer coefficient at that given station. (Author)

AD-432 241 Div. 9
OTS price $7.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
AN EXPERIMENTAL STUDY OF HYPERSONIC LOW-DENSITY VISCOUS EFFECTS ON A SHARP FLAT PLATE,
by R. J. Vidal, T. C. Golian and J. A. Bartz. 1964, 77p.
Contract AF49 638 952
Unclassified report

Descriptors: (*Flat plate models, Hypersonic characteristics), Heat transfer, Angle of attack, Boundary layer transitions, Viscosity, Shock waves, Pressure, Superaerodynamics.

Heat transfer and pressure data were obtained with sharp flat plate models at zero and large angles of attack in the CAL hypersonic shock tunnel. These high Mach number data (Mach 14 to 24) extend from the classical thin boundary layer regime to near-free-molecule conditions and are discussed within the framework of existing theory. The large angle-of-attack results verify viscous shock-layer theory and define the low-density conditions where transport effects at the shock wave first become important. The data obtained at zero angle of attack are compared with theory to define the fluid mechanism that governs the low-density effects. The strong shock-wave approximations, the vorticity interaction, and the shock-wave heating effect are unimportant in this case. For the present experiments, the effects of transport processes at the shock wave are numerically small in comparison with surface slip for the sharp flat plate at zero angle of attack, and it is postulated that surface slip is the dominant low-density effect. The slip boundary conditions are discussed to demonstrate that there is a pressure jump at the surface, analogous to the classical velocity and temperature jump. This effect is evaluated using existing theories and is in qualitative agreement with the experimental data. The slip boundary conditions are examined in

light of the present experiments at zero angle of attack, and it is shown that the usual first-order boundary conditions are inapplicable for the case of a cold wall. (Author)

AD-432 263 Div. 9
OTS price $9.60

David Taylor Model Basin, Washington, D. C.
EXPERIMENTAL INVESTIGATION OF NEAR-SURFACE HYDRODYNAMIC FORCE COEFFICIENTS FOR A SYSTEMATIC SERIES OF TEE HYDROFOILS, DTMB SERIES HF-1,
by Jerome Feldman. Dec 63, 119p.
Proj. SF013 02 01, Task 1703
DTMB 1801 Unclassified report

Descriptors: (*Hydrofoils, Stability), Aspect ratio, Angle of attack, Fluid dynamic properties, Cavitation, Model tests, Hydrofoil boats, Lift, Experimental data, Control, Theory, Velocity.

Experiments were conducted with the DTMB planar-motion-mechanism system to determine the normal and longitudinal components of force for DTMB Series HF-1, a systematic series of Tee foils designed to operate in the subcavitating regime. The resulting data are presented in a form applicable to the hydrodynamic design of high-speed hydrofoil craft from the standpoint of stability and control. The data are further analyzed to establish the effects of parameters such as Froude Number, depth of submergence, and aspect ratio. Comparisons are made to determine the extent to which existing theories produce agreement with the experimental data. (Author)

AD-432 355 Div. 9. 31
OTS price $9.60

Vidya, Inc., Palo Alto, Calif.
THE EFFECT OF FLOW SEPARATION FROM THE HULL ON THE STABILITY OF A HIGH-SPEED SUBMARINE.
Technical rept. no. 1,
by S. B. Spangler, A. H. Sacks and J. N. Nielsen.
15 Aug 63, 118p. Rept. no. 107
Contract Nonr393400, Proj. S R009 01 01
Unclassified report

Descriptors: (*Submarines, Stability), (*Submarine hulls, Hydrodynamics), Incompressible flow, Separation, Viscosity, Vortices, Bodies of revolution, Slender bodies, Angle of attack, Pressure, Pitch (Motion), Turbulent boundary layer, Two dimensional flow, Mathematical models, Mathematical analysis.

The problem of predicting theoretically the force distribution induced on a submarine hull by flow separation at high angle of attack is considered. The hull is taken to be a body of revolution with a pointed tail. The flow is assumed to be incompressible and inviscid. The assumptions of slender-body theory are used, and the steady, three-dimensional vortex configuration on the leeward side of the inclined body is represented by an unsteady, two-dimensional vortex motion in a normal plane. The resulting force distribution is determined in terms of an assumed variation of the location of the separation line on the body with axial length. The theory is applied to the case of a high-speed submarine at angle of attack. The total forces and moments on the submarine are determined as the sum of the forces predicted by slender-body theory in the absence of separation and the forces predicted by the separation theory. Experimental data on the location of separation on an inclined cylindrical body are used with the theory to predict the normal force and pitching moment for angles of attack up to 20 degrees for a typical submarine configuration. Nonlinear effects attributable to separation are found to start at an angle of attack of approximately 8 degrees. (Author)

AD-432 457 Div. 9
OTS price $11.50

General Dynamics/Convair, San Diego, Calif.
EXPERIMENTAL INVESTIGATIONS OF SUPERCAVITATING HYDROFOILS WITH FLAPS,
by A. C. Conolly. Dec 63, 155p. Rept. no. GDC63 210
Contract NObs84615
Unclassified report

Descriptors: (*Hydrofoils, Cavitation), Pressure, Flaps, Model tests, Test methods, Moments, Lift, Drag, Angle of attack, Air, Reliability, Test equipment, Velocity, Deflection, Load distribution, Hydrodynamics, Fluid dynamic properties, Split flaps.

This report presents smooth-water towing basin test data for two zero-dihedral supercavitating hydrofoils of aspect ratio 3.0, mounted by a single center strut and fitted with various sizes of split trailing-edge flaps. Measurements were made of hydrofoil and flap forces and moments over a wide coverage of parameters. The near-optimum flap size for a modified Tulin two-term foil giving maximum foil lift is shown to be flap chord equal to 3/10 of foil chord and flap span equal to 9/10 of foil span. Pressure mapping of the foil lower surface indicates that lower surface lift coefficients are essentially independent of speed, and that more than 50% of the foil lift comes from the upper surface for cavities which are only partially fed with atmospheric air. Data extrapolated to a cavitation number of zero are shown to agree with theory by Johnson, extended by Lin to cover the case with flaps. (Author)

AD-432 473 Div. 9, 25
OTS price $5.60

Aerodynamic Lab., Ohio State U., Research Foundation, Columbus.
MEASUREMENTS OF AERODYNAMIC AND RADIATIVE HEATING AT SUPER-ORBITAL VELOCITIES,
by Robert M. Nerem. 15 Jan 64, 51p. Rept. no. 1598 1
Contract AF33 657 10110, Proj. 1366, Task 136615
Unclassified report

Descriptors: (*Stagnation point, Heat transfer), (*Aerodynamic heating, Heat transfer), Atmosphere entry, Hypersonic characteristics, Transport properties, Thermal radiation, Gas ionization, Thermodynamics, Enthalpy, Shock waves, Wind tunnel models, Model tests, Measurement, Meter, Resistance thermometers, Calorimeters, Gas flow, Films.

Using an arc driven shock tube facility, measurements of aerodynamic and radiative stagnation point heating have been carried out at simulated flight velocities ranging from 20,000 to 40,000 ft per sec. The measurements of aerodynamic heating were performed using standard calorimeter techniques, while the radiative measurements were carried out through the use of a thin film radiation heat transfer gage developed at The Ohio State University Aerodynamic Laboratory. The present results indicate no significant ionization effects on aerodynamic heating and indicate that the Lees approximate equation for stagnation point heat transfer can be used for engineering purposes for flight velocities up to 40,000 feet per sec. The radiative heat transfer measurements, though of a preliminary nature, indicate that present estimates of radiative emission in the flight velocity range of 34,000 to 40,000 ft. per sec may be as much a factor of 3 - 4 too high. (Author)

AD-432 491 Div. 9
OTS price $9.60

Douglas Aircraft Co., Inc., Long Beach, Calif.
THE SEPARATION OF AXIALLY SYMMETRIC TURBULENT BOUNDARY LAYERS. PART II. DETAILED MEASUREMENTS IN THE BOUNDARY LAYERS ON SEVERAL SLENDER BODIES IN INCOMPRESSIBLE FLOW,
by J. S. Murphy. 2 Aug 55, 120p. Rept. no. ES17513
Contract NOas52 066
Unclassified report

Descriptors: (*Turbulent boundary layer, Separation), (*Slender bodies, Turbulent boundary layers), Bodies of revolution, Axially symmetric flow, Velocity, Shear stresses, Incompressible flow, Two-dimensional flow, Measurement, Mathematical prediction, Friction, Pressure, Surfaces, Wind tunnel models, Model tests, Manometers, Pitot tubes, Measurement, Theory, Experimental data.

Detailed measurements of turbulent boundary layer velocity profiles and shear stress distributions on three slender bodies of revolution in incompressible flow are presented. Comparison of the results with those found in two-dimensional flows indicates no appreciable influence of lateral curvature on the Law of the Wall or use of H as a shape parameter for the outer region of the velocity profile except where the boundary layer thickness exceeds body radius. Values of wall shear stress determined by the method of Clauser-Coles are in excellent agreement with values measured using a shear stress pitot tube according to the method of Preston, while those predicted by the Ludwieg-Tillmann formula are greater than measured values in the adverse pressure gradient regions of the flows. Disturbing the turbulent layer at transition by blowing through the surface leads to an increase in theta and a reduction in H which delays separation slightly when compared with the undisturbed layer. (Author)

AD-432 586 Div. 9, 25
OTS price $2.60

Mechanical Technology, Inc., Latham, N. Y.
SURFACE DISPLACEMENT OF A CONVECTIVE ELASTIC HALF-SPACE UNDER AN ARBITRARILY-DISTRIBUTED FAST-MOVING HEAT SOURCE,
by F. F. Ling and V. C. Mow. 29 Feb 64, 25p. Rept. no. 63TR49
Contract Nonr372900FBM
Unclassified report

Descriptors: (*Thermal stresses, Fluids), (*Hydrodynamics, Elasticity), Thermal diffusion, Thermal conductivity, Integral transforms, Fourier analysis, Temperature.

A solution of the normal displacement of the elastic half-space under an arbitrarily-distributed fast-moving heat source of constant velocity within the two-dimensional quasi-static, uncoupled thermoelasticity theory is presented. The surface of the half-space is allowed to dissipate heat by convection. Moreover, an example associated with the problem of elasto-hydrodynamics is given. (Author)

AD-432 720 Div. 9, 25, 15
OTS price $4.60

Arizona U., Tucson.
USE OF PHASE INVERSION TO ATTENUATE FLUID PRESSURE PULSES IN A DUCT,
by Richard G. Bryant. 1964, 48p.
Unclassified report

Master's thesis.

Descriptors: (*Pipes, Pressure), (*Fluid flow, Noise), Mathematical predictions, Acoustics, Sound, Motion, Attenuation, Mechanical waves, Damping, Pulse amplifiers, Interference, Oscillation, Vibration, Fluids.

The purpose of this study was to investigate the possibility of attenuating fluid pressure fluctuations in a duct by introducing phase-inverted pulses at the same frequencies. Theoretical predictions were made from an analysis of applicable theory. Experimental test results were examined for possible sources of error. Conclusions and recommendations have been drawn from a comparison of the theoretical and experimental work. (Author)

AD-432 724 Div. 9
OTS price $5.60

North Carolina State Coll., Raleigh.
THE STABILITY AND CONTROL CHARACTERISTICS OF A GENERALIZED FLIGHT VEHICLE USING CANARD CONTROL SURFACES,
by Glenn Harold Sutton. 1964, 56p.
Unclassified report

Master's thesis.

Descriptors: (*Canard configurations, Stability), (*Aerodynamic control surfaces, Canard configurations), Lift, Pitch (Motion), Leading edge flaps, Trailing control surfaces, Flaps, Airplane models, Angle of attack.

AD-432 831 Div. 9
OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
INVESTIGATION OF FLOW SEPARATION ON A TWO-DIMENSIONAL FLAT PLATE HAVING A VARIABLE-SPAN TRAILING-EDGE FLAP AT M INFINITY EQUAL TO 3 AND 5,
by S. R. Pate. Mar 64, 42p.
Contract AF40 600 1000, ARO Proj. VD0350
AEDC TDR64 14 Unclassified report

Descriptors: (*Flate plate models, Boundary layer), (*Boundary layer, Separation), Angle of attack, Pressure, Reynolds number, Model tests, Flaps, Deflection, Test equipment, Boundary layer transition, Laminar boundary layer, Turbulent boundary layer, Wind tunnel models, Supersonic characteristics, Trailing control surfaces, Two-dimensional flow.

An experimental investigation of separated boundary-layer flow was conducted on a two-dimensional flat plate having a variable-span trailing-edge flap in the 12-in. Supersonic Tunnel (D) of the von Karman Gas Dynamics Facility. The tests were made at Mach numers 3 and 5 at zero angle of attack and over a Reynolds number range (based on plate length) from 0.26 to 16.7 x 10 to the 6th power. Model surface pressure distributions, schlieren photographs, and velocity distributions are presented. The effects of unit Reynolds number, plate length, flap span, and flap deflection angle on the separated region are investigated, and comparisons are made with existing theory. (Author)

AD-432 976 Div. 9
OTS price $6.60

Hydronautics Inc., Laurel, Md.
LOW-DRAG BASE VENTED HYDROFOILS DESIGNED FOR OPERATION NEAR THE FREE SURFACE,
by Steven E. Starley and Virgil E. Johnson, Jr.
Nov 63, 61p. Rept. no. TR001 15
Contract NObs84296

Unclassified report

Descriptors: (*Hydrofoils, Hydrodynamic configurations), (*Hydrodynamic configurations, Theory), Pressure, Configuration, Drag, Lift, Velocity, Cavitation, Tables, Data.

Linearized cavity flow theory is used to determine the shape and cavity drag of a series of low cavity drag base vented hydrofoils having constant chordwise pressure distribution and operating at a particular depth-chord ratio. This family of base vented hydrofoils is generated by perturbing a quasiparabolic nonlifting thickness distribution so as to produce a base-vented lifting hydrofoil with a uniform loading. Numerical calculations are carried out to determine the shape, cavity drag coefficient, section modulus, and lift-drag ratio for two-dimensional base-vented hydrofoils over a wide range of lift coefficients and incipient cavitation numbers at various depth chord ratios. Families of zero cavity drag base-vented foils are also presented for the same depth-chord ratios. (Author)

AD-433 052 Div. 9
OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
AN EXPERIMENTAL STUDY OF SECONDARY FLOW IN JET-DRIVEN VORTEX CHAMBERS,
by D. H. Ross. 27 Jan 64, 56p. Rept. no. ATN64 9227 1

Unclassified report

Descriptors: (*Hilsch tubes, Vortices), (*Vortices, Flow visualization), Fluid flow, Water, Cylindrical bodies, Dyes, Infection, Three-dimensional flow, Viscosity, Axially symmetric flow, Boundary layer, Centrifugal fields, Shear stresses, High speed photography.

The characteristics of vortex flows in enclosed chambers are strongly influenced by the existence of three-dimensional secondary flows in the end-wall boundary layers and in a region near the axis. Classical 'line-vortex' or two-dimensional treatments fail to account for these effects and no theoretical treatment to date has been able to account for all of the complicated interactions. A series of flow visualization experiments was conducted to obtain a qualitative picture of the flow and the effects of changes in geometry and flow parameters. A transparent vortex chamber and selective dye injection into the water-working fluid were utilized. Interest centered on changes in the surface and shape of the end walls and on the exit hole. A form of end-wall-boundary-layer slot blowing was effective in altering the secondary flow pattern. An approximate analysis is made to determine the effect of non-planar end-walls on boundary layer radial mass flow, based on the G. I. Taylor result for a conical swirl flow. (Author)

AD-433 097 Div. 9, 12
OTS price $3.00

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
PRESSURE MEASUREMENTS FOR MACH FIVE FLOWS OVER WINGED RE-ENTRY CONFIGURATIONS WITH AERODYNAMIC CONTROLS. PART I. BLUNT CABIN CONFIGURATION,
by Louis G. Kaufman, II. Feb 64, 167p.
Contract AF33 616 8130, Proj. 8219, Task 821902
RTD TDR63 4179, pt. I Unclassified report

Descriptors: (*Spacecraft cabins, Blunt bodies), (*Boost-glide vehicles, Model tests), Wind tunnel models, Cylindrical bodies, Airplane noses, Hemispherical shells, Delta wings, Fins, Spoilers, Trailing control surfaces, Flaps, Deflection, Angle of attack, Hypersonic characteristics, Hypersonic flow, Pressure, Reentry vehicles, Aerodynamic control surfaces, Aero dynamic configurations.

Pressure data were obtained for Mach five flows over winged reentry configurations composed of cylindrical cabins mounted on a 60 degree sweepback delta wing with a cylindrical leading edge, clipped tips, and trailing edge flaps. The model was tested with spherical and conical fronts on the cabin, with and without tip fins, and with and without a trailing edge spoiler. Flap deflections were varied from -40 to +40 degrees and the model was pitched at angles of attack from -30 to +45 degrees for a free stream Reynolds number, based on model length of 3,575,000. (Author)

AD-433 149 Div. 9, 15
OTS price $3.60

Computation Lab., Harvard U., Cambridge, Mass.
FLOW UNDER A SLUICE GATE,
by Carl de Boor. Mar 61, 35p.
Contract Nonr186634

Unclassified report

Descriptors: (*Fluid flow, Hydrodynamic configurations), (*Water entry, Levees), (*Fluid flow, Mathematical analysis), Hydrodynamics, Jets, Dams, Boundary layer, Stagnation point, Conformal mapping, Integral equations.

The flow under a sluice gate at different Froude numbers is calculated approximately, using an integral equation method. Integral equations are also obtained characterizing three other ideal steady plane flows in a uniform gravity field: the jet from a slot, the flow over a sharp-crested weir, and the flow over a flat sill. (Author)

AD-433 233 Div. 9
OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
HIGH VELOCITY RATIO NEAR FREE MOLECULAR FLOW PAST A NARROW STRIP,
by J. Enoch and N. Macri. Oct 63, 39p. Rept. no. R63SD81
Contracts AF04 647 617 and AF04 694 222

Unclassified report

Descriptors: (*Fluid flow, Molecules), Numerical analysis, Fluid dynamic properties, Kinetic theory, Gases, Aerodynamic characteristics, Moments, Stresses, Velocity, Functions.

The problem of high velocity ratio near free molecular flow past a narrow strip is studied from the point of view of a previously developed kinetic model. The finite strip problem is approximated by the infinite strip problem. The logarithmic divergences arising in the infinite strip problem are handled by means of a cutoff procedure which is discussed in detail. Extensive numerical calculations of all the relevant aerodynamic quantities are presented. (Author)

10. FUELS AND COMBUSTION

AD-431 259 Div. 10, 25, 4
OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
THE ROLE OF ALUMINUM AND ITS OXIDES AS SOURCES OR MODERATORS OF ELECTRONS IN SOLID PROPELLANT ROCKET EXHAUSTS.
Quarterly status rept. no. 5, 1 July-30 Sep 63, by G. Neil Spokes. 30 Sep 63, 30p.
Contract AF04 694 128, Proj. PAU4134
Unclassified report

Descriptors: (*Exhaust gases, Gas ionization), (*Photoelectric affect, Exhaust gases), (*Thermionic emission, Exhaust gases), (*Aluminum compounds, Exhaust gases), Particles, Ionization, Flames, Surfaces, Ions, Oxides, Recombination reactions, Reaction kinetics, Solid rocket propellants.

Studies were made of the photoelectric properties of flame-treated aluminum oxide and rocket exhaust particle samples. The materials exhibit similar properties. The thermionic work function of rocket exhaust particles is probably one or two tenths of an eV below the photoelectric value, 3.7 eV. Previous reports have primarily considered the role of particles as thermionic sources of electrons; attention is now turned to indirect processes such as surface ionization, surface recombination, and surface chemionization. Particle surface area per gram of particles and a parameter related to thermionic emission were estimated from published data about particle size distributions. From estimates of particle surface area per cc of exhaust gas the inference is made that ionization kinetics may be appreciably affected by the presence of particulate matter in the exhaust gases of aluminized propellant rockets. (Author)

AD-431 315 Div. 10
OTS price $14.00

General Electric Co., Cincinnati, Ohio.
EFFECT OF HYDROCARBON FUELS ON THE OPERATION OF VAPOR PHASE FUEL SYSTEMS.
Rept. for June 62-Apr 63,
by G. G. Kutzko. Jan 64, 208p.
Contract AF33 616 8224, Proj. 3048, Task 304801
ASD TDR62 920 pt. 2 Unclassified report

Descriptors: (*Fuel systems, Heat exchangers), (*Fuels, Hydrocarbons), (*Hydrocarbons, Fuel systems), Calorimeters, Enthalpy, Heat transfer, Kerosene, Combustion, Alkanes, Jet engine fuels, Experimental data, Vaporization, High-temperature research, Vapors, Feasibility studies, Decomposition, Polycyclic compounds.

Ten hydrocarbon fuels were evaluated in a vaporizing heat exchanger to fuel exit temperatures up to 1300 F in order to determine the feasibility of vaporizing fuels prior to combustion as a means of achieving increased heat absorbing capacity of fuels and determining the relationship between fuel properties and performance of a vaporizing system. The heat sinks obtained by use of these fuels rate approximately (in decreasing heat sink order) mixed normal paraffins, a special JP-6, hydrindan, Soltrol 170, HTF-35, SO2 treated naphthenic kerosene, decalin, pinane and clay treated furfural extract of light cycle gas oil. JP-4 (referee), a clay treated furfural extract of light cycle gas oil and pinane plugged the heat exchanger apparatus and are considered unsatisfactory for use as vaporizing fuels. The highest rates of heat transfer were found to be grouped in decreasing order as (JP-6, Soltrol 170, decalin and mixed normal paraffins), (HTF-35 SO2 treated naphthenic kerosene), hydrindan, (pinane, furfural extract of light cycle gas oil), and JP-4. Combustion testing did not show significant differences among the fuels tested. (Author)

AD-431 674 Div. 10
OTS price $1.60

Army Missile Command Redstone Arsenal, Huntsville, Ala.
CURE STUDY OF ''FLUID BALL'' POWDER,
by Everette M. Pierce. 3 Jan 64, 14p.
Proj. 1A222901A211
AMC RA RK TR64 1 Unclassified report

Descriptors: (*Solid rocket propellants, Aging (Materials)), (*Solid rocket propellant plasticizers, Aging (Materials)), (*Aging (Materials), Solid rocket propellants), (*Nitrocellulose, Aging (Materials)), Powders, Esters, Nitrates, Particle size, Gels.

A cure mechanism of Fluid Ball powder and triethylene glycoldinitrate was conducted. The objective was to determine if all the ball powder was completely dissolved during the current process or if most of the cure was by gelation. Experimental results showed that ball powder spheres were discrete after normal cure time and temperature. Fluid Ball powder will completely dissolve in triethylene glycoldinitrate if the powder is made from low nitration level nitrocellulose.Penetration of plasticizer and cure rate increase with temperature. Powder particles can be observed as round and oval objects in cured propellant compositions by microscopy and radiography. Cure mechanism is by gelation and swelling of Fluid Ball powder by the plasticizer with a small amount of the powder spheres being completely dissolved. (Author)

AD-431 823 Div. 10, 26
OTS price $8.10

Valley Forge Technology Center, Philadelphia, Pa.
PROPELLANT STORABILITY IN SPACE.
Quarterly rept. no. 2, 1 Oct 63-31 Jan 64,
by W. Benton, R. Carr, A. Cohen, G. Gustafson and C. Lankton. Feb 64, 89p.
Contract AF04 611 9078, Proj. 6753, Task 675301
RPL TDR64 22 Unclassified report

Descriptors: (*Liquid rocket propellants, Storage), (*Storage, Liquid rocket propellants), (*Propellant tanks, Space environmental conditions), Cryogenics, Cylindrical bodies, Spheres, Thermal insulation, Coatings, Space environmental conditions, Nitrogen, Halogenated hydrocarbons, Simulation, Environmental tests.

Space simulation studies demonstrated that the operating temperature of earth storable propellant tanks may be accurately controlled by means of selected coatings. Since the tank will eventually come to the average skin temperature, the propellant temperature may be similarly controlled. Any short term variations in external heat fluxes, such as is experienced by an orbiting vehicle, will be damped out in the propellant tank because of its high thermal inertia. (Author)

AD-431 872 Div. 10
OTS price $2.60

Atlantic Research Corp., Alexandria, Va.
TECHNIQUES FOR THE STUDY OF COMBUSTION OF

Division 10 - FUELS AND COMBUSTION

BERYLLIUM AND ALUMINUM PARTICLES,
by A. Macek, R. Friedman and J. M. Semple.
Feb 64, 25p. Rept. no. TR ARC 8 P
Unclassified report

In cooperation with Virginia Univ., Charlottesville, Va. Contract Nonr362300. Presented at the AIAA Conference on Heterogeneous Combustion, Dec 63, Palm Beach, Fla.

Descriptors: (*Combustion, Metals), (*Beryllium, Combustion), (*Aluminum, Combustion), Ignition, Particles, Particle size, High pressure research, Ammonium compounds, Perchlorates, Low pressure research, Oxygen, Moisture, Luminescence, Photographic analysis, Solid rocket fuels, O-heterocyclic compounds.

The purpose of this report is (1) to present the application of a previously developed technique to the study of Be particle ignition, and (2) to describe a recently developed technique for observation of fine details of metal particle burning which has so far been applied to Al only. Efforts are now being made to extend this technique to combustion of Be. Minimum ignition temperatures for single Be particles, under total pressures of up to 50 atmospheres, ranged from 2380 to 2650 K depending on the partial pressure of oxygen in the ambient gas. Atmospheric pressure photographic studies of fine details of Al combustion also were made and are discussed. (Author)

AD-432 233 Div. 10, 12, 4
OTS price $10.50

Stanford Research Inst., Menlo Park, Calif.
ANALYSIS OF MINUTEMAN EXHAUST PRODUCTS.
Final rept.,
by Eugene A. Burns. 25 Oct 62, 139p.
Contract AF33 600 36610, Proj. PRD3753
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Rocket motors (Solid propellant), Exhaust gases), (*Exhaust gases, Rocket motors (Solid propellant)), (*Combustion products, Solid rocket propellants), Chemical analysis, Chromatographic analysis, Mass spectroscopy, Infrared spectroscopy, Sampling, Combustion, Aluminum, Ammonium compounds, Perchlorates, Combustion chamber gases, Volumetric analysis, Polarographic analysis, Titanium, Tantalum, Carbon dioxide, Monoxides, Carbon compounds, Aluminum compounds, Oxides, Test equipment, Hydraulic actuators, Captive tests, Spectrophotometers, Isocyanate plastics.

Analytical methods based primarily on infrared spectroscopy, gas-solid partition chromatography, and mass spectroscopy were developed for the compositional determination of trapped rocket exhaust gases; the validity of the methods was established by analysis of synthetic mixtures of typical exhaust gases. Analytical methods have also been devised for the compositional analysis of trapped solid exhaust products; these methods have been checked by analysis of synthetic mixtures. A technique for trapping the exhaust products in the vicinity of the exit plane was developed. (Author)

AD-432 472 Div. 10, 25
OTS price $5.60

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
MEASUREMENT OF HEAT FLUX IN SOLID PROPELLANT ROCKETRY,
by Charles E. Brookley. Nov 63, 56p. Rept. no. ABL A60
Contract NOrd16640
Unclassified report

Presented at Instrument Society of America 18th Annual Conference 9 Sep 63 at Chicago, Illinois.

Descriptors: (*Heat transfer, Solid rocket propellants), (*Caolorimeters, Instrumentation), Ablation, Combusion chamber liners, Thermocouples, Transducers, Emissivity, Captive tests, Aluminum.

A radiometer and slug-type calorimeters were designed, calibrated, and mounted flush with the inner surface of the internal chamber insulation of a solid-propellant rocket motor. During repeated static firing of this motor, the magnitude of the heat flux was measured and divided into radiant and convective components. Measurements were taken in the unit while using both aluminized nonaluminized propellants. (Author)

AD-432 822 Div. 10, 25
OTS price $3.60

Instituto Nacional De Tecnica Aeronautica (Spain).
ON THE STRUCTURE OF LAMINAR DIFFUSION FLAMES,
by Amable Linan. 1 June 63, 40p. Rept. no. TR FM63 2
Grant AF EOAR63 43
AFOSR 64 0151 Unclassified report

Descriptors: (*Flames, Mathematical analysis), (*Diffusion, Flames), (*Reaction kinetics, Flames), Configuration, Equations, Differential equations, Theory, Temperature, Distribution, Reynolds number, Integral equations.

The structure of laminar diffusion flames is analyzed in the limiting case of large, although finite, reaction rates. It is shown that the chemical reaction takes place only in a very thin region or chemical boundary layer where convection effects may be neglected. Then the temperature and mass fraction distributions within the reaction zone are obtained analytically. The flame position, rates of fuel consumption, and temperature and concentration distributions outside of the reaction zone may be obtained by using the assumption of infinite reaction rates. For large Reynolds numbers mixing and combustion take place in boundary layers and free mixing layers. And again analytical solutions are obtained for the temperature and mass fraction distributions outside of the reaction zone. (Author)

AD-433 006 Div. 10, 30
OTS price $6.60

Rocketdyne, Canoga Park, Calif.
DEVELOPMENT OF HIGH-ENERGY SOLID PROPELLANT FORMULATIONS. VOLUME 2: BERYLLIUM PROPELLANT HANDLING MANUAL.
Final summary rept.
Jan 64, 66p.
Contract AF04 611 8179, Proj. 3059, Task 305902
RPL TDR64 10 Unclassified report

Descriptors: (*Solid rocket propellants, Hazards), (*Hazards, Beryllium), (*Beryllium, Hazards), Toxicity, Safety, Handling, Manufacturing methods, Contamination, Atmospheric pollution, Decontamination, Diffusion, Meteorology, Samplers, Monitors, Tests, Test facilities.

11. GROUND TRANSPORTATION EQUIPMENT

AD-432 163 Div. 11, 12, 8
OTS price $7.60

Boeing Co., Seattle, Wash.
ELECTRO-INTERFERENCE TEST REPORT ON TRANSPORTER-ERECTOR TRACTOR ASSEMBLY, FIGURE A 4075,
by C. F. Harrigill. 26 Feb 62, 75p. Rept. no. T2 2714
Contract AF04 647 289

Unclassified report

Descriptors: (*Transporter-erectors, Radio-frequency interference), Tests, Tractors.

Tests were conducted to determine the level of generated electro-interference and susceptibility to electro-interference of a transporter-erector tractor assembly for use in the Minuteman program. The test sample exceeded the specification limits by 6[illegible]db. (Author)

AD-432 338 Div. 11, 18
OTS price $1.00

RAND Corp., Santa Monica, Calif.
EARLY FAILURES IN AUTOMOBILE PARTS: A BACKGROUND STUDY IN RELIABILITY,
by W. H. Hausman and Milton Kamins. Mar 64, 34p. Rept. no. RM4002 PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Vehicle accessories, Reliability), (*Failure (Mechanics), Vehicle accessories), Probability, Passenger vehicles, Sampling, Time, Statistical data, Statistical analysis, Vehicle chassis components, Quality control.

The early mortality of automobile parts is examined here through the analysis of warranty-claim information from one American manufacturer of passenger cars for the model year 1961. The Weibull probability distribution is fitted to the early claims data to indicate the trend -- increasing, or constant -- in the observed failure rate. Since the data come from a non-random sample, a simulation of the claim-generating process is performed to develop the exposure pattern and permit the actuarial determination of the true conditional failure rates for the analysis. The results show that a substantial majority of the 36 parts analyzed display a very distinct decrease in the observed failure rate during the first few thousand miles of operation. Two parts which were studied categorically elsewhere show the constant failure rate found by previous studies, and one part with an increasing failure rate is shown to operate in a progressively increasing stress-regime. We conclude that the economic limitations on quality-control efforts in this industry result in a higher proportion of initial (but hidden) defects by comparison with the aircraft parts studied previously. We also conclude that quality control and running-in are at least partial substitutes for one another. (Author)

12. GUIDED MISSILES

AD-431 242 Div. 12, 15, 25
OTS price $7.60

Army Missile Test and Evaluation Directorate, White Sands Missile Range, N. Mex.
MATH MODEL OF GRAVITY TORQUES AND INTERNAL TORQUES CAUSED BY GYROS AND INERTIA WHEELS ON AN EARTH-POINTING ORBITING VEHICLE,
by James S. Pappas. Feb 64, 72p.
AMTED TN52 Unclassified report

Descriptors: (*Scientific satellites, Mathematical models), (*Stabilization systems, Torques), Gravity, Stresses, Topology, Rotation, Mathematical analysis, Analytic geometry, Functions, Control systems, Vector analysis, Matrix algebra, Linear systems, Roll, Pitch (Motion), Yaw, Aerodynamic loading, Motion, Gimbals, Jets.

The math model is presented for simulation purposes of an earth-pointing-orbiting vehicle. The gravity torques on the vehicle are derived as a function of the geometrical mass distribution matrix - that is, the vehicle inertia matrix, and the orientation of body principal axes with respect to local vertical. Torques on the vehicle due to internal rotating devices such as gyros, flywheels, etc., are also discussed. (Author)

AD-431 294 Div. 12, 27, 33
OTS price $1.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
PROGRAM 624A INTERFACE CONTROL REQUIREMENTS SPECIFICATION.
1 Nov 62, 20p.
SSD 62 164 Unclassified report

Descriptors: (*Launch vehicles (Aerospace), Standardization), Indexes, Documentation, Scheduling, Specifications, Guided missile components, Mechanical drawings, Research program administration.

This document establishes a system for preparing Interface Specifications (IFS) and Interface Control Drawings (ICD) (outside the scope of hardware production drawings), which record the design agreements between Program 624A associate contractors in those areas of interface involving the hardware, equipment, installation and test requirements, and facilities produced by two or more associate contractors. For the purpose of describing this interface control plan a spacecraft contractor or agency will be considered to be an associate contractor and facility design criteria documents shall be considered as interface specifications. (Author)

AD-431 298 Div. 12, 1
OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
AN AUTOMATIC LANDING SYSTEM FOR LOW LIFT-DRAG GLIDE VEHICLES,
by R. A. Nesbit. 15 Nov 63, 48p. Rept. no. TDR269 4540 50 1
Contract AF04 695 269
SSD TDR63 341 Unclassified report

Descriptors: (*Aerospace craft, Landings), (*Landings, Aerospace craft), Automatic, Boost-glide vehicles, Simulation, Descent trajectories, Instrument landings, Lift, Drag, Altimeters, Automatic navigators.

The pitch plane dynamics of a landing vehicle are studied by analytic approximation and analog simulation. A landing system design is discussed for application to low lift/drag vehicles. Flare velocity loss minimization is studied using the maximum principle. (Author)

AD-431 500 Div. 12
OTS price $4.60

Space Technology Labs., Inc., Redondo Beach, Calif.
THERMAL RADIATION FROM THE EXHAUST PLUME OF AN ALUMINIZED COMPOSITE PROPELLANT ROCKET,
by S. J. Morizumi and H. J. Carpenter. Jan 64, 41p. Rept. no. 6121 7904RU000
Contract AF04 694 1
BSD TDR64 16 Unclassified report

Descriptors: (*Exhaust flames, Thermal radiation), Base flow, Surfaces, Emissivity, Heating, Particles, Aluminum compounds, Oxides, Statistical functions, Optical properties, Temperature, Rocket motors (Solid propellant), Exhaust gases.

A technique is developed for calculating rocket base heating and spacecraft heating environments due to particle radiation from a single nozzle rocket exhaust plume. The technique has proved successful when applied to a single nozzle exhausting into a rarefied atmosphere on the basis of comparison of predictions with experimental results. The analysis treats radiation from a cloud of particles as that from an equivalent radiating surface. Thus, the problem is reduced to the determination of the proper values of the apparent surface emissivity and the effective temperature. In defining the apparent emissivity of the particle plume, an analogy with neutron scattering for a cylindrical cloud is adopted which shows the apparent emissivity to be dependent on particle emissivity and cloud optical thickness. Since the plume is non-uniform in particle size, concentration, and temperature, certain averaging techniques are used to define values of optical thickness and temperature. (Author)

AD-431 706 Div. 12
OTS price $13.00

Aerospace Corp., Los Angeles, Calif.
STRESSES IN THIN VESSELS UNDER INTERNAL PRESSURE,
by Norman N. Au. 15 Jan 64, 186p. Rept. no. TDR269 4304 5
Contract AF04 695 269
SSD TDR63 367 Unclassified report

Descriptors: (*Pressure vessels, Stresses), (*Cylindrical bodies, Stresses), Structural shells, Joints, Mathematical analysis, Loading (Mechanics), Elasticity, Steel, Aluminum, Ellipsoids, Hydrostatic pressure.

Elastic stresses are presented for thin shells of revolution under the action of internal pressure. The formulas given are developed on the basis of Love's classical shell theory. The pressure vessel configurations under consideration consist of various commonly encountered head closure designs integrally joined to circular cylindrical shell sections. In addition to the membrane stresses, the bending stresses resulting from forces and moments at the junctures of the heads and cylinders are also presented. The concept of edge influence numbers is used where convenient to express the discontinuity forces and moments at the junction. Many important parameters are expressed in graphical forms to facilitate analysis. (Author)

AD-431 712 Div. 12
OTS price $4.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
DESIGN STUDY FOR A HIGH G GYRO AS PART OF A RESEARCH FEASIBILITY STUDY OF NEW CONCEPTS IN HIGH G INERTIAL INSTRUMENTS,
by Aubrey Rodgers. 15 Nov 63, 48p.
Proj. DA04 495ORD3563Z
AMC RA RG TR63 28 Unclassified report

Descriptors: (*Gyroscopes, Bearings), Design, Torque, Inertial guidance, Journal bearings, Feasibility studies, Guided missiles (Surface-to-surface), Detectors, Fluids, Amplifiers.

Results are presented of a research feasibility study of a gyro suitable for operation in a 100-200 g environment. Discussed are the theory of operation, design equations, and a preliminary design for such a gyro. (Author)

AD-431 770 Div. 12
OTS price $9.10

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
PAYLOAD PLANNING FOR THE SLV-1B SPACE PROBE,
by Richard M. Joppa. Feb 64, 103p.
AFSWC TDR64 1 Unclassified report

Descriptors: (*Space probes, Launch vehicles (Aerospace), (*Launch vehicles (Aerospace), Space probes), Rocket motors (Solid propellant), Payload, Weight, Telemeter systems, Power supplies, Air force research.

The advantages and disadvantages of using the SLV-1B as a launching vehicle are reviewed. The SLV-1B is a relatively low-cost, high-performance space probe, used principally for conducting relatively light-weight experiments in the region beyond 10,000 nautical miles, or for conducting preliminary test flights for satellite and deep space missions. Included in the report are discussions of payload weights, apogees, environment volumes, launch facilities, documentation, schedules, and applicable agencies in the SLV-1B program. The SLV-1B program utilizes an all-USAF planning, procuring, documenting, technical consulting, and launching organization. (Author)

AD-431 782 Div. 12, 6, 30
OTS price $1.60

Mitre Corp., Bedford, Mass.
THE USE OF SATELLITES FOR CALIBRATION OF BMEWS RADARS,
by R. F. Shackford. Feb 64, 16p. Rept. no. TM3350
Contract AF19 628 2390 Proj. 474L
ESD TDR63 454 Unclassified report

Descriptors: (*Search radar, Calibration), Satellites (Artificial), Antimissile defense system, Early warning systems, Volocities, Computers, Data, Programming (Computers), Punched cards.

Interest has recently been expresseu by the BMEWS Program Office in the possibility of using satellites on known orbits to calibrate the BMEWS radars. A method of doing this was investigated over a year ago with negative results. This document describes the method used and the results obtained, and includes as an appendix a report written by Dr. H. B. Wackernagel, then 496L, who contributed extensively to the study. The work described herein was done several years ago, and shows why it has not, in the past, been considered desirable to calibrate BMEWS target coordinate measurements on the basis of satellite observations. However, it must be emphasized that improvements in computer programs and input data would necessitate a reevaluation of the conclusions contained herein. (Author)

AD-431 784 Div. 12
OTS price $8.10

Naval Ordnance Lab., White Oak, Md.
THE DESIGN AND DEVELOPMENT OF THE ARCHER SOUNDING ROCKET,
by H. J. Gauzza, R. H. Cornett and R. T. Groves. 14 June 63, 83p.
NOL ARR200, TR63 144 Unclassified report

Descriptors: (*Sounding rockets, Design), Aerodynamic configurations, Aerodynamic heating, Aerodynamic loading, Firing tests (Ordnance), Flight testing, Ionosphere, Stability, Payload, Plastic coatings.

Archer is an economical, single-stage sounding rocket capable of carrying a 25-pound payload to an altitude of 100 miles for IQSY studies. The aerodynamic as well as mechanical design considerations used in the production of this rocket are described. Included in the aerodynamic phase are the configuration design, the investigation of stability and the determination of aerodynamic loads and heating. Structural integrity with minumum weight and ease of manufacture are prime considerations in the mechanical design. Archer's performance is predicted and comparisons are made with the results of the first two test firings. (Author)

AD-431 843 Div. 12
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
DIFFERENTIAL FIRING CORRECTIONS AND ACCURACY FORMULAE,
by N. W. Albright. Feb 64, 31p. Rept. no. TDR269 4922 1
Contract AF04 695 269
BSD TDR63 216 Unclassified report

Descriptors: (*Intercept trajectories, Corrections), Equations, Errors, Targets, Mathematical analysis, Ballistics, Spaceborne, Launching, Trajectories, Interception.

We consider an object on a Keplarian ballistic trajectory outside the earth's atmosphere travelling toward a nominal target. What differential velocity correction must be applied to this object to hit a target differentially displaced in time and space from the nominal one. And what errors at the displaced target are produced by errors in the various firing parameters. (Author)

AD-431 884 Div. 12, 30
OTS price $3.60

Sperry Phoenix Co., Ariz.
REMOTE CONTROL RECOVERY SYSTEM (RCRS) FLIGHT TEST PLAN FOR AIR FORCE FLIGHT TEST CENTER (AFFTC).
18 Nov 63, 36p. Rept. no. 1273 0278
Contract AF33 657 9614
Unclassified report

Descriptors: (*Boost-glide vehicles, Remote control systems), Manned spacecraft, Recovery, Terminal flight facilities, Models (simulation), Flight control systems, Research pro-

gram administration, Test methods, Flight testing, Jet fighters, Simulation, Command guidance, Descent trajectories, Radar tracking, Radar beacons, Transponders, Specifications, Landings, Flight paths, Terminal guidance.

The System Development Test Plan to be conducted at Edwards Air Force Base on the X-20 Remote Control Recovery System (RCRS) is outlined. The RCRS has an integrated tracking, command and data link capability and is to be used for terminal control and recovery of the X-20 unmanned flights. For the purposes of this flight test plan, the RCRS functions and physical characteristics remain unchanged, except that a QF-104 is substituted as a test bed vehicle in lieu of the X-20. The system configuration consists of an airborne radar transponder, flight control coupler, and airspeed sensitive unit installed in the vehicle to be controlled, and two ground control stations. The flight test program is designed to check out the RCRS, simulate X-20 recovery, and provide controller familiarization. This system test plan is the basic planning document to accomplish the aims stated above. Detailed briefings conducted prior to each mission should include the applicable information in this document. Mission profiles are provided following each phase of the test plan. (Author)

AD-431 896 Div. 12, 30
OTS price $2.60

Sylvania Electric Products Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN) EXPERIMENTAL TEST PLAN,
by L. McGonigle. 15 Feb 64, 27p. Rept. no.
MPO PD 0057
Contract AF04 694 261
Unclassified report

Descriptors: (*Test methods, Ground support equipment), (*Ground support equipment, Test methods), Electronic equipment, Management engineering, Tests, Test equipment (Electronics).

An experimental test plan is presented that describes the planned GES experimental test program. This plan covers management organization, operational procedures, documentation, test categories, and test equipment required for the conduct of the experimental test program using applicable prototype equipment of the Minuteman Ground Electronics System. (Author)

AD-431 900 Div. 12, 30
OTS price $8.60

Naval Postgraduate School, Monterey, Calif.
MITROVIC'S METHOD - SOME FUNDAMENTAL TECHNIQUES,
by George J. Thaler and Toymi Ohta. Jan 64, 96p.
NPS RP39 Unclassified report

Descriptors: (*Linear systems, Mathematical models), (*Control systems, Design), (*Projective geometry, Polynomials), Conformal mapping, Differential equations, Transformations (Mathematics), Programming (Computers), Determinants, Feedback, Linear programming, Computers.

Mitrovic's method states: if all of the roots of a polynomial be inside some area in the s-plane, then proof of this can be established by enclosing the area by a contour, mapping the contour onto a polar plane through the characteristic polynomial as a mapping function, and analyzing the polar contour with the Principle of Argument. Only the imaginary axis or a radial straight line in the left half plane are chosen as mapping contours closing the contour through a circular arc of infinite radius so as to enclose all or part of the left half plane. If this is done for a polynomial for which all coefficients are known numerically, then the actual values of the coefficients which were designated variables are the coordinates of a single point on the Mitrovic plot. Mitrovic showed how to evaluate stability and all left half plane roots of the polynomial from his curves and the location of this one point. If this point, called the M-point, is moved to a new location new roots and new coefficient values are defined. Then the physical system can be changed so that the two designated coefficients assume their new values without changing any other coefficients. To this he added considerable detail regarding specific techniques for using the method to design feedback control systems. (Author)

AD-431 935 Div. 12, 2, 20
OTS price $7.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE ARGUS EXPERIMENT, CALIBRATION OF EXPLORER IV PROTOTYPE,
by E. O. Baicy, Juergen Bock and T. R. Jeter.
21 Oct 63, 76p.
DASA WT 1671 Unclassified report

Descriptors: (*Scientific satellites, Nuclear explosions), (*Radiation measurement systems, Spaceborne), Calibration, Gamma rays, X rays, Beta particles, Geiger counters, Gamma counters, Scintillation counters, Radiation monitors, Electrons, Discriminators.

Detailed calibration curves were determined for a prototype Explorer IV radiation-measuring satellite in accordance with a prior mathematical analysis. This analysis had demonstrated the necessity for calibration of the complete package in a well-prescribed manner if the maximum amount of information was to be obtained from the transmitted data. Previous data analysis had been limited to consideration of average count rates because of limited information about the angular response of the detectors. Since it was of primary interest to obtain mirror point distributions of the trapped electrons in the earth's magnetic field, emphasis was placed on the determination of the directional characteristics of the detectors. The package was calibrated with gamma rays, X-rays, and electrons over both azimuthal and inclination angles. (Author)

AD-432 006 Div. 12, 14, 26
OTS price $22.25

Flight Dynamics Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
AEROSPACE EXPANDABLE STRUCTURES,
1963, 418p.
Unclassified report

Descriptors: (*Extendable structures, Symposia), (*Symposia, Extendable structures), Design, Inflatable structures, Expanded plastics, Space environmental conditions, Spacecraft, Lunar bases, Space stations, Parawings, Shelters, Communication satellites (Passive), Structures, Analysis, Mechanical properties, Deceleration, Payload, Recovery, Solar panels.

AD-432 034 Div. 12
OTS price $21.00

RCA Service Co., Inc., Patrick Air Force Base, Fla.
THE ACCURACY OF AMR INSTRUMENTATION,

by H. P. Mann. 13 Dec 63, 361p.
Contract AF08 606 5300
MTC TDR64 1 Unclassified report

Supersedes AFMTC TDR 63-3, AD-406859.

Descriptors: (*Guided missile tracking systems, Errors), Guided missile ranges, Instrumentation, Optical equipment, Electronic equipment, Acoustic equipment, Analysis of variance, Inertial guidance, Least squares method, Correlation techniques, Radar tracking, Optical tracking, Guided missile trajectories, Measurement, Motion picture cameras, Partial differential equations.

The annual summary statements of the accuracy of Atlantic Missile Range Tracking Instrumentation are presented in this report. The statements are based on studies conducted by RCA systems analysis. The report also provides a detailed discussion of the definition of errors encountered in tracking system evaluations, methods and techniques used to estimate errors, specific AMR methodologies including data analysis flow diagrams and a discussion of the variance - covariance error propagation required to determine the accuracy of reduced position, velocity and acceleration data. Work on the determination of instrumentation accuracy is a continuing project and revisions and refinements to the estimates of accuracy are issued periodically as additional information is made available. (Author)

AD-432 042 Div. 12, 26, 27
OTS price $15.00

Rocketdyne, Canoga Park, Calif.
STUDY, DESIGN, AND TEST OF EXPERIMENTAL LIQUID HYDROGEN PUMP FOR USE IN FLIGHT VEHICLE SYSTEMS.
Final rept., 15 Feb-15 Oct 62.
Feb 63, 225p. Rept. no. R3892
Contract AF33 657 8062, Proj. 3145, Task 30328
ASD TDR63 114 Unclassified report

Descriptors: (*Fuel pumps, Hydrogen), (*Reciprocating pumps, Design), Performance (Engineering), Liquid rocket fuels, Liquefied gases, Specifications, Feasibility studies, Rocket motors (Liquid propellant), Auxiliary power plants, Mathematical analysis, Configuration, Test methods, Environmental tests, Test sets, Test equipment, Compatibility, Cryogenics, Friction, Bearings, Lubrication, Rotary seals, Hydrostatics, Mechanical drawings, Acceptability, Gas seals.

The results of the analytical test and design efforts of an 8-month liquid hydrogen micropump feasibility study program are presented. A generalized analytical study was performed to evaluate the types of pumps which might be applicable to pump two-phase hydrogen at 2 to 12 lb/hr. Based on the results of this study, a single-plunger, positive displacement pump was selected as the type best suited to meet the design requirements. Detailed analyses and design studies of piston pumps were performed. The selected piston pump was designed, and a performance analysis was completed. (Author)

AD-432 064 Div. 12, 27, 14, 30
OTS price $1.60

General Electric Co., Cincinnati, Ohio.
DYNAMIC SHAFT SEALS IN SPACE.
Quarterly rept. no. 7, 16 Oct 63-15 Jan 64.
15 Jan 64, 17p.
Contract AF33 657 8469
Unclassified report

Descriptors: (*Rotary seals, Shafts), (*Seals (Stoppers), Space environmental conditions), High temperature research, Liquid metals, Vapors, Potassium, Pressure, Life expectancy, Lubricants, Design, Configuration, Maintainability, Specifications, Test methods, Test facilities, Test equipment, Computers, Programming (Computers), Performance (Engineering), Fluid dynamic properties, Gaskets.

This reporting period covers the following: (1) Investigating modifications to the dynamic zero leakage seal, (DZL seal); (2) Seal testing for the SNAP-8 project using ET-378 oil; (3) Checking out the DZL seal developed at Evendale for the SNAP-8 project; (4) Adapting computer for use in the reduction of the test data obtained during the water seal testing; (5) Manufacturing the liquid metal seal test rig; and (6) Manufacturing of the liquid metal seal test facility. (Auhtor)

AD-432 096 Div. 12
OTS price $9.10

Boeing Co., Seattle, Wash.
ELECTRO-INTERFERENCE TEST REPORT ON POWER SUPPLY GROUP, FIGURE A 1379,
by L. R. Dickson. 19 Dec 61, 107p. Rept. no. T2 2802
Contract AF04 647 289
Unclassified report

Descriptors: (*Power supplies, Guided missiles (Surface-to-surface)), Radio interference, Experimental data, Tests, Frequency, Test equipment, Battery charger, Simulation, Direct current, Interference, Air Force.

The purpose of the test is to determine, by actual test and recording of data, the amount of interference, both radiated and conducted, that the Test Item generates. Power Supply Set number 2, serial number 0001, LF, Boeing Part Number 25-25561, Figure A 1379 consists of one rack containing two battery charger power supplies and the associated control relay. Both supplies provide 36 volts direct current, one at 60 amperes capacity and a second at 5 amperes capacity, continuous duty. The Test Item requires 120 volts, 60 cycles input power. (Author)

AD-432 117 Div. 12
OTS price $11.00

Boeing Co., Seattle, Wash.
ELECTRO-INTERFERENCE TEST REPORT ON MINUTEMAN CTLI, FIGURE A 9186 AMPEX SERIES FR-600 RECORDER-REPRODUCER.
by M. C. Lai. 1 May 62, 145p. Rept. no. T2 2817
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile components, Radiofrequency interference), Test methods, Tests, Recording systems.

Electro-Interference tests were performed and suppression measures were installed on Figure A 9186 Ampex FR-600 Recorder/Reproducer (Test Item) per GM 07-59-2617A (Reference 2.1) specifications. The Test Item was found to be in compliance with reference 2.1 requirements except at the data points, as shown in Table 1, page 9. Waivers have been requested to permit such deviations. (Author)

AD-432 156 Div. 12
OTS price $22.25

Boeing Co., Seattle, Wash.
ELECTRO-INTERFERENCE TEST ON MINUTEMAN FIGURE A

9233 POWER SUPPLY SET, C/D AND T/M,
by T. R. Wilson. 28 Nov 62, 436p. Rept. no. T2 2728
Contract AF04 647 289
Unclassified report

Descriptors: (*Power supplies, Guided missiles (Surface-to-surface), Interference, Filters (Electromagnetic wave), Tests, Air Force, Performance (Engineering), Test equipment, Experimental data, Test facilities, Radio interference.

Contents: Section I - Electro-Inteference Test on Minuteman Figure A 9233, Power Supply Set, C/D and T/M; Section II - Electro-Interference Test on Minuteman Figure A 9233, Power Supply Set, C/D and T/M, Visual/Aural Warning Drawer.

AD-432 190 Div. 12
OTS price $2.75

Systems Technology, Inc., Inglewood, Calif.
COMPETING FLIGHT CONTROL SYSTEMS FOR ENTRY GLIDER LATERAL CONTROL,
by Irving L. Ashkenas and Duane T. McRuer.
Feb 64, 138p.
Contract AF33 616 5903, Proj. 8219, Task 821904
ASD TDR62 699 Unclassified report

Descriptors: (*Adaptive control systems, Boost-glide vehicles), Descent trajectories, Flight control systems, Optimization, Manned, Mathematical analysis, Stability, Roll, Yaw, Ailerons, Aerial rudders, Aerodynamic control surfaces.

Three competing adaptive lateral control systems for an entry glider are evolved and compared. In the course of the evolutionary process, entry vehicle dynamic characteristics are examined and approximate literal transfer functions are determined; some handling qualities requirements are postulated and competing systems consistent with these requirements are indicated; the systems are formulated and studied using multi-loop analysis techniques where appropriate. The systems evolved all include a function of bank angle fed to aileron, as an outer-loop. Detailed consideration is given to the functional form of the adaptive adjustments required for equalization and gain. (Author)

AD-432 285 Div. 12, 30
OTS price $3.60

Brown Engineering Co., Huntsville, Ala.
A FORTRAN PROGRAM TO CALCULATE A BALLISTIC MISSILE TRAJECTORY FROM LAUNCH OR ANY POINT THEREAFTER TO IMPACT,
by W. B. Warren. Dec 63, 35p. Technical note no. R84
Contract DA01 009AMC75Z
Unclassified report

Descriptors: (*Guided missile trajectories, Programming (Computers)), (*Programming (Computers), Guided missile trajectories), Programming languages, Computers, Launching, Terminal ballistics.

This program computes a two-dimensional, point mass ballistic trajectory from any point, either during burning or after burnout, to any point thereafter to impact. The program takes into account air resistance and the variation of the gravitational field with altitude. It uses a system of co-ordinates (X and Y) with the origin at the starting point of the trajectory. The program is written in FORTRAN IV for the IBM 7040 computer. (Author)

AD-432 336 Div. 12
OTS price $3.60

RAND Corp., Santa Monica, Calif.
CRITERIA FOR THE DESIGN AND USE OF AUTOMATED MISSILE GROUND EQUIPMENT TO IMPROVE MISSILE READINESS,
by Joseph R. Brom. 20 Apr 61, 29p.
Rept. no. P2269
Unclassified report

Descriptors: (*Checkout equipment, Automation), (*Guided missiles, Checkout equipment), Checkout procedures, Mathematical analysis, Launching, Design, Failure (Mechanics), Flight control system, Inertial guidance, Probability, Test methods, Malfunction, Detection, Errors, Maintenance, Reliability, Operations research, Guided missile components, Ground support equipment.

One part o am overall ICBM weapon system problem, that of objective criteria for the design and use of automatic checkout equipment is discussed. (Author)

AD-432 670 Div. 12, 6, 24
OTS price $3.60

Autometric Corp., New York.
GEOCENTRIC POSITION AND/OR ORBITAL PARAMETERS WITH STAR-SATELLITE PHOTOGRAPHY FROM A SINGLE CAMERA STATION,
by Everett Merritt. 1 Nov 63, 33p. Rept. no. CR102 1
Contract DA009AMC178X
Unclassified report

Descriptors: (*Satellites (Artificial), Optical tracking), Photogrammetry, Position finding, Data processing systems, Orbital trajectories, Determination, Geometry, Stars, Mathematical analysis, Astronomical cameras.

AD-432 834 Div. 12
OTS price $2.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN). DETAILED TEST REQUIREMENTS DOCUMENT. MISSOURI TEST PROGRAM (MTP).
27 Feb 64, 28p. Rept. no. MPO SR 14 100
Contract AF04 694 261
Unclassified report

Descriptors: (*Ground support equipment, Electronic equipment), Guided missiles (Surface-to-surface), Air Force, Test methods, Test facilities, Performance (Engineering), Radio equipment, Antennas, Radio transmitters, Propagation, Reliability, Errors, Atmospherics, Simulation, Antenna radiation patterns, Electrical impedance, Soils, Electrical conductance, Ground (Electrical), Research program administration.

AD-432 836 Div. 12, 2
OTS price $15.00

Naval Ordance Test Station, China Lake, Calif.
WATER-CURRENT INVESTIGATION OF POLARIS UNDERWATER LAUNCH SITE, SAN CLEMENT ISLAND, CALIFORNIA,
by George V. Shaefer. Jan 64, 224p.
Task 24401
NOTS TP3309; NAVWEPS 8394
Unclassified report

Descriptors: (*Launching sites, Ocean currents), (*Ocean currents, Launching sites), Data, Oceanographic data, Test equipment, Velocity, Time, Punched tape, Magnetic tape, Underwater, Guided missiles (Underwater-to-surface), Guided missiles (surface-to-surface), Navy.

Water currents in the Polaris test area were investigated with four Roberts current meters spaced at depths of 10, 36, 72, and 144 feet. Velocity and directional information were processed electronically and stored on paper tapes, from which the data were reduced by computers to digital form. All data except the 36-foot recordings, which indicated doubtful directional values, are considered reliable. Survey results indicate that currents were weak, averaging 0.20 fps (0.12 knot) at all depths. Strongest currents were less than 1.0 fps (0.6 knot). The currents are primarily tidal in nature, and generally flow northwesterly during flood tide and southeasterly during ebb tide. The directional pattern may change from this general condition owing to the influence of surface environmental action. (Author)

AD-432 841 Div. 12
OTS price $6.60

Aerospace Corp., Los Angeles, Calif.
A NEW METHOD OF ATTITUDE STABILIZATION,
by A. S. Gutman. 23 Jan 64, 65p. Rept. no. TDR 269 4513 10 2
Contract AF04 695 269
SSD TDR63 358 Unclassified report

Descriptors: (*Attitude control systems, Satellites (Artificial)), (*Satellites (Artifical), Attitude control systems), Reflectors, Gravity, Stabilization systems, Damping, Communication satellites (Active), Reconnaissance satellites, Spin, Optical scanning, Satellite antennas, Control jets, Satellite attitude.

The basic purpose of stabilization to beam radiation into a definite direction is combined with the stabilization system by means of a stabilized reflector. A spin-stabilized satellite is magnetically or electrostatically suspended on a gravity-gradient stabilized reflector. The reflector serves to direct the radiation emanating axially from the spin-stabilized satellite toward the earth. This concept is demonstrated on a communications satellite and on a surveillance satellite in which the spin motion of the satellite is used to generate a continuous circular scan on the surface of the earth. The dynamics of a satellite combining spin-stabilization with gravity-gradient stabilization by a vertistat are analyzed. The equation of attitude motion is derived and solutions for the motion of the vertistat with reference to the local vertical are obtained. The frequency of vibration of the satellite under disturbing forces is found to be a design constant of the system. Since it is possible to design for a high constant frequency of vibration in the roll and yaw axis vibrations, damping by means of a tuned damper can be achieved effectively and quickly. For the pitch axis vibration, an active damping by one cold gas pulse jet is proposed. The same pulse jet can be used to compensate for angular spin velocity decay and also for station-keeping or obit period control. (Author)

AD-432 986 Div. 12, 25
OTS price $1.60

Naval Missile Center, Point Mugu, Calif.
DETERMINATION OF MOMENTS OF INERTIA: A FACILITIES STUDY,
by H. C. Merhoff. 12 Mar 64, 15p.
Task R34U1S003A
NMC MP64 1 Unclassified report

Descriptors: (*Moments, Determination), (*Guided missiles, Moments), Test facilities, Test methods, Equations.

The facilities for determination of mass moments of inertia of missiles at the Naval Missile Center have been examined in order to extend their capabilities to meet future requirements. Emphasis has been placed upon increasing the accuracy of the measurements and the weight and length of missiles which can be accommodated by the facility. It is concluded that the amount of manual manipulation required for moment of inertia measurements can be reduced by improving the usefulness of present equipment. (Author)

AD-433 049 Div. 12, 6
ots price $5.60

Aerospace Corp., Los Angeles, Calif.
A DIGITAL SIMULATION PROGRAM FOR THE INTERCEPTION OF A TARGET BY AN INTERCEPTOR USING PROPORTIONAL NAVIGATION SCHEMES,
by J. P. Janus and W. J. Wollenberg. 31 Jan 64, 54p. Rept. no. TDR269 4540 50 2
Contract AF04 695 269
SSD TDR64 7 Unclassified report

Descriptors: (*Proportional navigation, Interception probabilities), (*Interception probabilities, Programming (computers)), (*Intercept trajectories, Programming (computers)), Simulation, Guidance, Inertial guidance, Tracking, Handbooks.

This report is a handbook for the use of the TGIF program which has recently been modified. The TGIF program is a digital simulation program which may be used to study the boost, midcourse, and homing phase of the interception of a target by an interceptor using proportional navigation. The program will be most useful after hand calculations have established general tactical cases, and before complex guidance and control studies are performed on an analog computer. Given the initial positions, velocities and accelerations of the target and the interceptor, the target acceleration profile, and guidance parameters for the interceptor guidance system, this program computes a homing intercept trajectory based upon maintaining a zeroline-of-sight rate between the target and itself. The equations of motion are written in a relative coordinate system fixed on the target position. Gravity effects are not included; however, accelerating targets may be considered. The option of biased proportional navigation is also available. Homing thrust orientation is obtained by either of two methods: Roll-to-turn and Y configuration (3 engines) with a roll capability. (Author)

AD-433 051 Div. 12, 27
OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
COMPARISON OF IMPULSIVE PROPULSION REQUIREMENTS FOR NONPLANAR ORBITAL CHANGE WITH CONTINUOUS PROPULSION WITH OR WITHOUT AUXILIARY AERODYNAMIC FORCES.
by H. Nakayama. 3 Feb 64, 60p. Rept. no. TDR269 4560 30 1
Contract AF04 695 269
SSD TDR63 366 Unclassified report

Descriptors: (*Satellites (Artificial), Transfer trajectories), (*Transfer trajectories, Thrust), Circular orbit trajectories, Inter-

cept trajectories, Rendezvous trajectories, Rocket propulsion, Electric propulsion, Nuclear propulsion, Energy management, Mathematical models, Equations, Specific impulse.

An investigation was made of the propulsion system requirements for a circular orbital plane change of a vehicle with/without auxiliary aerodynamic forces. A transfer with constant velocity along a minor circle shows thrust acceleration reduction when auxiliary serodynamic forces are not used and propellant consumption reduction when auxiliary aerodynamic forces are used. (Author)

AD-433 096 Div. 12
OTS price $9.60

Pacific Missile Range, Point Mugu, Calif.
PACIFIC MISSILE RANGE MANUAL. VOLUME III. RANGE FACILITIES AND INSTRUMENTATION.
1 Aug 63, 113p.
PMR MP63 7 Unclassified report

Descriptors: (*Guided missile ranges, Military facilities), Guided missile tracking systems, Launching, Tracking, Data processing systems, Ground support equipment, Launching sites, Mobile, Ships, Instrumentation, Aircraft, Vehicles, Performance (Engineering), Maps, Aerial photographs, Radar equipment, Optical tracking, Telemeter systems, Command & control systems, Meterological instruments, Communication equipment, Handling, Storage, Guided missile launchers.

AD-433 163 Div. 12
OTS price $6.60

Aerospace Corp., Los Angeles, Calif.
THE EFFECT OF GEOPHYSICAL AND GEODETIC UNCERTAINTIES AT LAUNCH AREA ON BALLISTIC MISSILE IMPACT ACCURACY,
by R. G. Gore. 22 Jan 64, 63p. Rept. no. TDR 269 4922 2
Contract AF04 695 269
BSD TDR63 256 Unclassified report

Descriptors: (*Launching sites, Geophysics), Launching, Geodesics, Guided missiles, Errors, Circular error probable, Mathematical analysis, Velocity, Data, Deflection, Inertial guidance, Radio Homing, Guidance, Equations, Guided missile trajecteries.

The effects of uncertainties in the geophysical and geodetic parameters releated to the establishment of ballistic missile launch sites on the impact accuracy of the ballistic missile are derived analytically. Curves of the derived impact miss coefficients are presented for radio- and inertially-guided missiles for ranges of 500 to 21,000 nautical miles and burnout angles of 5 to 90 degrees from the vertical. (Author)

AD-433 176 Div. 12
OTS price $9.60

RAND Corp., Santa Monica, Calif.
A SIMULATION MODEL OF AN INERTIAL GUIDANCE SYSTEM REPAIR SHOP: A PLANNING TOOL,
by R. C. Steorts. Mar 64, 112p. Rept. no. RM3599PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Maintenance equipment, Inertial guidance), (*Inertial guidance, Maintenance equipment), (*Model (Simulation), Maintenance equipment), Management engineering, Failure (Mechanics), Simulation, Models (Simulation), Scheduling, Guided missiles (Surface to surface), Test facilities, Programming languages.

This Memorandum describes a simulation model developed at RAND to help system planners at Newark Air Force Station, Newark, Ohio, determine resource requirements to test and repair an expected number of failed ICBM guidance systems in some average repair cycle time. If given estimates of shop load and a set of resources, the simulation model will measure resource performance in terms of the average repair cycle time. Resources considered are direct personnel, test equipment, and component spares. The model was written in the RAND-developed simulation language, SIMSCRIPT, for use on the IBM-7090 series of computers. In the Memorandum, the general problem confronting system planners is briefly discussed, followed by a description of a typical guidance system repair shop and the types of outputs that aid the planner in determining resource requirements. Then the general structure and a detailed description of the simulation model is presented. And finally, the Memorandum describes in detail how the data deck required by the simulation model is prepared for a typical repair shop. (Author)

AD-432 220 Div. 12
OTS price $5.60

Boeing Co., Seattle, Wash.
ELECTRO-INTERFERENCE TEST REPORT, WS-133A, WING III, BOEING PACIFIC TEST CENTER - LAUNCH SYSTEM COMPLEX,
by J. C. Windell. 24 Feb 64, 57p. Rept. no. T2 2852 1
Contract AF04 647 757
Unclassified report

Descriptors: (*Launching sites, Interference), Compatibility, Instrumentation, Tests, Control systems, Launching, Test equipment, Test methods, Guided missile launchers, Experimental data, Circuits, Guided missiles (Surface to surface), Malfunctions, Air Force.

This document describes the Wing III Launch System Complex Electro-Interference System Compatibility Tests that were performed at Boeing Pacific Test Center to demonstrate the degree of compliance with military specification MIL-I-006051B. The test consisted of instrumenting the Launch System Complex such that certain critical points, within the system, would evidence increased susceptibility to the effects of electro-interference. The Weapon System was then exercised through normal operational modes and system response noted. Proper system response, while thus instrumented, demonstrates a degree of freedom from electro-interference determined by the calibration of the instrumentation. The tests described herein were performed per the procedures of D2-7853-1 in accordance with test matrix D2-15461-1. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-431 606 Div. 13, 14
OTS price $16.00

Structural Mechanics Research Lab., U. of Texas, Austin.
A STUDY OF VERMICULITE CONCRETE AS A SHOCK-ISOLATING MATERIAL,
by Eugene F. Smith and J. Neils Thompson.
Oct 63, 247p.
Contract DA22 079eng342
Unclassified report

Descriptors: (*Concrete, Underground structures),(*Underground structures, Concrete),(*Nuclear explosions, Underground structures), Vibration isolators, Shock resistance, Shock waves, Mechanical properties, Water, Moisture, Molding (Materials), Air, Aging (Materials), Mixtures, Costs, Silicates.

The purpose of this study was to develop information from which vermiculite concrete can be evaluated as a shock-isolating material. Although studies indicated that air content and cement-to-aggregate ratio significantly affect the energe-absoring characteristics of vermiculite concrete, age and degree of saturation do not appear to be significant factors. Two methods of mix design were developed from which the first trial mix proportions of vermiculite concrete with preselected characteristics could be dtermined. For large-scale pumping operations, it was recommended that air content, wet unit weight, and slump measurements be taken periodically to insure that vermiculite concrete with preselected shock-isolating characteristics would be produced. (Author)

AD-431 625 Div. 13
OTS price $5.60

McDonnell Aircraft Corp., St. Louis, Mo.
EVALUATION OF SKID ABRASION RESISTANT MATERIALS.
Final rept.,
by J. F. Kreig. 10 Mar 64, 55p. Rept. no. A480
Contract AF33 657 11215
Unclassified report

Descriptors: (*Pallets, Wear resistance), Sleds, Towed vehicles, Abrasives, Materials, Concrete, Iron alloys, Chromium alloys, Alloys, Plastics.

This program was conducted in an attempt to eliminate costly replacement of equipment platforms and runners subjected to skidding abrasion on concrete surfaces. It was desired to determine which of the twelve materials investigated (including eight metals and four non-metals) would be most suitable for use as wearing pads to be attached to the bottom of platform runners. The samples were subjected to drag runs of 50, 100, 200, and 500 feet. Runs were made on a concrete surface at surface pressures of 33 and 119 psi and drag speeds of 5 and 15 mph. The forces required to initiate and maintain motion of the different materials on the concrete surface were also measured. Finally, the relative magnitude of sparking among the different materials was determined. On the basis of the test results, Haynes-Stellite Alloy No. 1 was found to have the best wear resistance of the twelve materials tested. The relative sparking of this alloy was slight. (Author)

AD-431 697 Div. 13
OTS price $18.00

ITT Communication Systems, Inc., Paramus, N. J.
COMPILATION OF BUILDING DESIGN INFORMATION FOR TELECOMMUNICATIONS BUILDINGS,
by R. R. Gulick. Mar 60, 290p.
Contract AF30 635 12857, Task D1191 03 00
ESD TDR64 221 Unclassified report

Subcontract to Tippetts, Abbett, McCarthy and Stratton, N. Y.

Descriptors: (*Communication systems, Buildings), (*Buildings, Communication systems), Design, Air force, Military facilities, Construction, Data, Tables, Floors, Lighting equipment, Ventilation, Radio equipment, Installation, Power supplies, Mechanical drawings, Instruction manuals.

A compilation is presented of pertinent design information for the construction of Air Force telecommunications buildings. Two subjects of investigation are presented: the assimilation and evaluation of design data for the purpose of indicating trends and practices previously used in military installations; and the compilation of a detailed list of construction criteria. Buildings for radio equipment, power supply, and support facilities are detailed in the report; frequent reference is made to Air Force, Navy, and Signal Corps installations. (Author)

AD-431 732 Div. 13
OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
PRELIMINARY STUDIES OF AIR CURTAINS FOR REFRIGERATED WAREHOUSES,
by C. L. Herndon. 24 Jan 64, 21p.
Task Y F015 04 04 302
NCEL Technical note N573
Unclassified report

Descriptors: (*Cooling & ventilating equipment, Warehouses), Refrigeration systems, Air, Thermal insulation, Blowers, Photographs, Mechanical drawings, Fog, Temperature, Gas flow.

The opening and closing of heavy doors wastes considerable time in refrigerated warehouses which have a large movement of food products. Open doors also cause refrigeration loss which may in turn cause spoilage. In an attempt to prevent refrigeration loss and still allow the door to remain open, a relatively high velocity stream of air, called an air curtain, is directed across the entrance. To evaluate the usefulness of air curtains a literature search was made, a file of literature from air curtain manufacturers was compiled and several installations in various parts of the country were visited. A study of existing installations indicate the air curtains can be effectively used in most refrigerated warehouses. Installations at Naval Supply Depots have been ineffective at times because visibility at the entrance was reduced by fog. This fog is caused by cold inside air mixing with warm moist outside air. As each installation has different problems and manufactures do not agree on design and operation criteria, it seems desirable to make tests where installation and operation may be closely supervised. From such a study, design and operation criteria could be prepared and the economic advantages of air curtains determined. (Author)

AD-431 905 Div. 13, 30
OTS price $11.00

Research Triangle Inst., Durham, N. C.
ANALYSIS OF SURVEY DATA, PART I.
Final rept.,
by E. L. Hill, W. K. Grogan, R. O. Lyday and H. G. Norment. 15 Feb 64, 148p. Rept. no. R OU81
Contract OCD OS62 144
Unclassified report

Descriptors: (*Shelters, Radioactive fallout) (*Radioactive fallout, Shelters), Analysis, Computers, Data processing systems, Vulnerability, Input-output devices, Communication systems, Determination, Programming (Computers, Statistical analysis, Design, Construction.

This report is separated into two parts. Part I report the analysis of data collection and protection factor (PF) computational procedures used in the National Fallout Shelter Survey (NFSS), under OCD Sub-task 1115A, Analysis of Survey Data. Part II contains sixteen appendices (A-P) to the chapters of Part I of the final report for OCD Sub-task 1115A, Analysis of Survey Data. These appendices contain details of computer programs used in categorization of structures with respect to technical shielding characteristics and resultant tabulations; details of the RTI 33 NFSS Phase 1 building sample selection method; and illustration of procedures used in identifying building elements critical to PF computations; RTI computational method and forms used in making Engineering Manual PF calculations for the 33 sample buildings; descriptions of the 33 buildings, the five PF results and analyses of individual building input and procedural differences judged to have affected the PF differences; construction details of four buildings used in comparing experimental and calculated PF's; trapped potable water field data gathered in the 33 building survey; detailed analyses of Technical Operations Research reports that affect the procedures used to calculate PF's (L-N); and detailed recommended modifications to the NBS-NFSS Computer Program. (Author)

AD-432 127 Div. 13, 15
OTS price $3.50

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
A STUDY OF MATRIX ANALYSIS METHODS FOR INELASTIC STRUCTURES.
Rept. for May 62-Aug 63,
by John H. Percy, William A. Loden and D. R. Navaratna. Oct 63, 216p.
Contract AF33 657 8717, Proj. 1467, Task 146701
RTD TDR63 4032 Unclassified report

Report on Structural Analysis Methods.

Descriptors: (*Matrix algebra, Structures), (*Structures, Mathematical analysis), (*Numerical methods and procedures, Reviews), Stresses, Bending, Shear stresses, Elasticity, Elastic shells, Creep, Aluminum, Tables, Bibliographies, Deformation, Plasticity, Buckling (Mechanics), Partial differential equations, Programming (Computers), Loading (Mechanics).

Matrix methods of structural analysis for structures exhibiting elastic-plastic and creep behaviors are reviewed. To elucidate the matrix methods, two problems in plane stress, a bending problem and a shear-lag problem, are chosen as examples. Both are analyzed by model matrix analysis programs, for elastic-plastic behavior by the displacement method and by the force method and for elastic-plastic-creep behavior by the displacement method. A continuous elastic analysis of the shear-lag problem is described and a formulation, for this problem, of a continuous analysis for creep is presented. Experiments conducted on aluminun shear-lag specimens at room temperature for elastic-plastic behavior and at an elevated temperature for elastic-plastic-creep behavior are described. The results of the analyses and experiments are compared. A critical discussion of matrix analysis methods for inelastic structures concludes the report. (Author)

AD-432 347 Div. 13
OTS price $4.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
NONLINEAR BUCKLING OF RECTANGULAR PLATES,
by Louis Bauer and Edward L. Reiss. Dec 63, 48p.
Rept. no. IMM NYU316
Contract Nonr28542
Unclassified report

Descriptors: (*Flat plate models, Buckling (Mechanics)), (*Buckling (Mechanics), Boundary value problems), Compressive properties, Stresses, Partial differential equations, Loading (Mechanics).

The nonlinear deflections of a thin elastic simply-supported rectangular plate are studied. The plate is deformed by a compressive thrust applied along the short edges. For the boundary value problem considered it is proven that the plate cannot buckle for thrusts less than or equal to the lowest eigenvalue of the linearized buckling problem. For larger thrusts approximate solutions of the von Karman equations are obtained by an accelerated iteration method. Each iterate is numerically evaluated by a finite difference procedure. Using this method approximate solutions are obtained for thrusts considerably larger than the lowest eigenvalue. These solutions bifurcate from the eigenvalues of the linearized problem. In addition, an asymmetric solution is found which appears to branch from a previously bifurcated solution. The extensive numerical results are used to study the formation of boundary layers and the related problem of the plate's ultimate load. On the basis of the numerical results, an energy mechanism is proposed to explain a mode-jumping phenomenon which has been previously observed in experiments. (Author)

AD-432 368 Div. 13, 31, 25, 15
OTS price $12.00

Electric Boat Div., General Dynamics Corp., Groton, Conn.
VIBRATION CHARACTERISTICS OF PLATES AND FOUNDATIONS.
Final rept. for 1963,
by D. J. Fisher and E. North. Dec 63, 169p.
Rept. no. U413 63 151
Contract NObs86643, Proj. SF013 11 01, Task 1360
Unclassified report

Descriptors: (*Flat plate models, Dynamics), (*Structural parts, Vibration), Metal plates, Acoustics, Hulls (Marine), Underwater sound, Matrix calculus, Tables, Foundations (Structures), Panels (Structural), Sheets, Structures, Supports.

The dynamic behavior of a flat plate stiffened by tee stiffeners was studied analytically and experimentally to determine the applicability of previously developed analytical programs to this type of stiffener. Analytical and experimental studies were also made to determine the effects of intercostal tee stiffeners and two types of foundations when mounted on the tee stiffened plate. These foundations and the intercostal stiffeners were also evaluated in the barge DEZIBEL to determine their acoustic effectiveness in water. (Author)

AD-432 453 Div. 13, 30
OTS price $2.60

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DIGITAL COMPUTER PROGRAM FOR THERMO-ELASTIC SOLUTION OF STATICALLY DETERMINATE (UNRESTRAINED) BEAMS BY FINITE SUM.

Rept. for 15 Mar-15 Jun 62,
by James R. Johnson. Jun 62, 25p.
Proj. 1467, Task 146705
ASD ASRNDS TM62 35 Unclassified report

Report on Structural Analysis Methods.

Descriptors: (*Programming (Computers), Loading (Mechanics)), (*Structural properties, Programming (Computers)), Digital computers, Beams (Structural), Stresses, Thermal stresses, Elasticity, Deformation.

This report describes an available IBM 7090 Computer Program which will calculate the stresses and deformations of cross sections of statically determinate beams due to mechanical or thermal loading and combined mechanical and thermal loading. The formulation of this analysis within the limitations of linear elastic theory and solution by the Finite Sum Technique provide rapid answers to practical problems. (Author)

AD-432 810 Div. 13
OTS price $7.60

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
FIELD MOISTURE CONTENT INVESTIGATION,
by M. J. Mathews and Z. B. Fry. Nov 63, 72p.
AEWES TR3 401 4 Unclassified report

Descriptors: (*Moisture, Soils), (*Soils, Moisture), (*Landing fields, Pavements), Hygrometers, Pavements, Measurement, Resistance (Electrical), Concrete, Clay, Calibration.

Investigations were conducted of moisture changes under flexible pavements and of the effectiveness of the Colman electrical resistance soil unit in measuring moisture content and changes in base course and subgrade beneath pavements. Data from soil moisture units installed in test items constructed with either crushed limestone or clay-gravel base courses placed at several moisture contents over a silty clay subgrade were compared with in-place moisture contents and meteorological data. Moisture units removed from the test section on completion of testing were calibrated in the laboratory. Results indicated that placement moisture content (a) increased in the clay-gravel base, (b) remained about the same in the limestone base, and (c) generally increased in the subgrade, especially under base courses placed dry of optimum. Attempts to determine actual in-place moisture content with the moisture units were unsuccessful. The units are considered capable of indicating a trend in moisture content of fine-grained materials, but not of coarse-grained materials. (Author)

AD-433 053 Div. 13, 15
OTS price $1.60

David Taylor Model Basin, Washington, D. C.
FORMULAS AND CURVES FOR DETERMINING THE ELASTIC GENERAL-INSTABILITY PRESSURES OF RING-STIFFENED CYLINDERS,
by William E. Ball, Jr. Jan 62, 21p.
Proj. S F013 03 02
DTMB 1570 Unclassified report

Descriptors: (*Stiffened cylinders, Elasticity), Mathematical analysis, Structural shells, Cylindrical bodies, Pressure, Mathematical prediction, Buckling, Stresses, Deformation, Hydrostatic pressure, Rings.

A set of curves for use in determining the elastic general-instability pressure of ring-stiffened cylindrical shells based on the equations of Kendrick and Bryant is presented. Also, several convenient formulas developed by other investigators are discussed. Numerical results obtained from these methods of solution are presented in tabular form for comparison. The pressures determined from the graphical solution of the Kendrick Part III analysis agree more closely with pressures predicted by Kendrick's equations than by other methods presented and are more easily obtained. (Author)

AD-433 191 Div. 13, 14
OTS price $9.60

Illinois U., Urbana.
EVALUATION OF TUNNEL LINERS IN GRANITE SHOT HARD-HAT, OPERATION NOUGAT. STATIC STRESS-STRAIN CURVES FOR VARIOUS MATERIALS INVESTIGATED FOR USE AS PACKING.
Final rept.,
by L. H. Klotz. Feb 64, 114p.
Contract AF29 601 4993, Proj. 1080, Task 108004
RTD TDR63 3041, vol. 3
Unclassified report

Descriptors: (*Underground structures, Packing materials), (*Shock (Mechanics), Absorption), Gravel, Porous materials, Shale, Slags, Concrete, Expanded plastics, Compressive properties, Strain (Mechanics), Stresses.

This volume contains the results of tests of various materials considered for use as backpacking in the Hard Hat tests. Specific trade names and manufacturers are referred to in this volume to define the materials tested more completely. In most instances similar materials are available from other manufacturers. Use of specific trade names herein should be interpreted only as a more complete definition of the characteristics of the materials actually tested. Since no effort was made to obtain random samples of materials, the results presented may not be representative of the materials in general. (Author)

AD-433 192 Div. 13, 14, 17
OTS price $4.60

Illinois U., Urbana.
EVALUATION OF TUNNEL LINERS IN GRANITE SHOT HARD-HAT, OPERATION NOUGAT. STATIC TENSION TESTS OF LINING MATERIALS AND STATIC TEST OF 8 GAGE TUNNEL LINER PLATE.
Final rept.,
by J. L. Merritt. Feb 64, 42p.
Contract AF29 601 4993, Proj. 1080, Task 108004
RTD TDR63 3041, vol. 4
Unclassified report

Descriptors: (*Underground structures, Structural shells), (*Structural shells, Materials), Metal plate, Steel, Reinforced concrete, Loading (Mechanics), Tensile properties, Strain (Mechanics), Stresses, Moments, Beams (Structural).

14. MATERIALS (NON-METALLIC)

AD-431 509 Div. 14, 12
OTS price $2.60

McDonnell Aircraft Corp., St. Louis, Mo.
ABLATION SHIELD DEVELOPMENT TESTING - ADHESIVE EVALUATION AND ELEVATED TEMPERATURE PROPERTIES.
Final rept.,
by Henry E. Reiling. 10 Mar 64, 25p. Rept. no. A472
Contract AF33 657 11215
Unclassified report

Descriptors: (*Adhesives, beryllium), (*Beryllium, Adhesives), (*Heat shields, Adhesives), High temperature research, Bonding, Ablation, Films, Shear stresses, Stresses, Aging (Materials), Reentry vehicles.

Surfaces of beryllium finger panels were processed for adhesive bonding. Various film adhesives and bonding methods for each adhesive were then used in bonding the beryllium finger panels together. After bond line curing the bonded finger panels were machined into individual lap shear tension test specimens. Test specimens were subjected to a series of tests for adhesive shear strength at room and elevated temperatures. Although the lap shear strength of HT-424 film adhesive was lower than other adhesives tested at room temperature and 500F its greater strength at 650F and 800F makes it the most desireable adhesive for use in bonding applications involving beryllium and high temperature environments. (Author)

AD-431 511 Div. 14
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
DETERMINATION OF LAP SHEAR PROPERTIES OF ADHESIVE NO. 18 FROM G. C. BORTHIG CO.,
by Henry E. Rieling. 10 Mar 64, 6p. Rept. no. A481
Contract AF33 657 11215
Unclassified report

Descriptors: (*Adhesives, Shear stresses), (*Metals, Bonding), Bonded joints, Aluminum alloys, Heat resistant materials, Temperature.

Adhesive number 18 (G. C. Borthig Co.) as indicated by the test results exhibits a higher lap shear strength at emperatures of 250, 300 and 350F. than at room temperature. Test results also indicate that the maximum lap shear strength was attained at an elevated temperature of 300F with higher temperatures resulting in a lower lap shear strength. (Author)

AD-431 512 Div. 14
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
DETERMINATION OF TENSILE LAP SHEAR STRENGTHS OF SEVERAL METAL-TO-METAL AND METAL-TO-LAMINATE CONFIGURATIONS.
Final rept.,
by J. Swafford. 10 Mar 64, 10p. Rept. no. A482
Contract AF33 657 11215
Unclassified report

Descriptors: (*Adhesives, Shear stresses), (*Metals, Bonding), (*Plastics, Bonding), Bonded joints, Tensile properties, Cleaning, Preparation.

Test data compiled under TR 45-157.02 indicated that the corner couch specimens fabricated from production parts (Metal-to-laminate configuration) are not developing expected strengths. This test program was initiated to compare the previously compiled data and to obtain data on alternate cleaning procedures and bonding materials to be used. Tensile lap-shear strengths were determined for several metal-to-metal and metal-to-laminate bonding configurations and two cleaning procedures were investigated. A comparison of the results obtained from TR 45-157.02 and this test request revealed that bond strengths obtained from specimens fabricated from production parts were abnormally low. AF 106 adhesive used in conjunction with cleaning procedures (MAC PS 14020) is recommended for bonding aluminum to aluminum and aluminum to F-141 prepreg. Also, FM 99 adhesive used in conjunction with cleaning procedure MAC PS (11308) is recommended for bonding aluminum to polyester laminate. (Author)

AD-431 513 Div. 14
OTS price $3.60

McDonnell Aircraft Corp., St. Louis, Mo.
DETERMINATION OF THE ENERGY ABSORPTION CHARACTERISTICS OF VARIOUS LOW DENSITY FOAM TYPE PLASTICS,
by J. Swafford. 10 Mar 64, 37p. Rept. no. A483
Contract AF33 657 11215
Unclassified report

Descriptors: (*Expanded plastics, Physical properties), (*Honeycomb cores, Physical properties), (*Energy, Absorption), Loading (Mechanics=, Deflection, Sandwich construction, Aluminum alloys, Mechanical properties.

Efforts were made to determine the energy absorption characteristics of various low-density plastic foam and aluminum honeycomb materials. Based on the results of this test program, aluminum honeycomb appears to present the best absorption characteristics of the low density type materials tested. (Author)

AD-431 514 Div. 14
OTS price $1.60

McDonnell Aircraft Corp., St. Louis, Mo.
EVALUATION OF THREE METHODS OF APPLYING ''SCOTCHCAL'' TO ALUMINIZED LACQUERED SURFACES.
Final rept.,
by Edward Kern. 10 May 64, 14p. Rept. no. A484
Contract AF33 657 11215
Unclassified report

Descriptors: (*Plastic coatings, Adhesion), (*Aircraft finishes, Adhesion), Aluminum coatings, Coatings, Aluminum alloys, Adhesion, Varnishes, Paint primers.

Peel strength specimens were prepared to compare the adhesion of the Scotchcal to alodined aluminum, zinc chromate primed, and aluminized lacquered surfaces. Two lacquers, MIL-L-7178 aluminized lacquer and color #16473 lacquer, were used. The highest average peel strengths (9.0 lbs per in.) were obtained from the specimens that had been prepared by applying the Scotchcal directly to the aluminized lacquer, after the lacquer had dried 8 to 24 hours. The lowest average peel strengths (5.5 pounds per in.) were obtained from the specimens that had been prepared by applying the Scotchcal either to the alodined aluminum or to the zinc chromate primed surfaces. (Author)

AD-431 515 Div. 14
OTS price $1.60

McDonnell Aircraft Corp., St. Louis, Mo.
INVESTIGATION OF MECHANICAL PROPERTIES OF FOAM-IN-PLACE SANDWICH AT ELEVATED TEMPERATURES.
Final rept.,
by D. W. Johnson. 10 Mar 64, 16p. Rept. no.

A485
Contract AF33 657 11215
Unclassified report

Descriptors: (*Airframes, Sandwich construction), (*Expanded plastics, Sandwich panels), Performance (Engineering), Compressive properties, Epoxy plastics, Laminated plastics, Glass textiles, Heat, Degradation, Aluminum alloys, Titanium.

Some design data concerning foam-in-place plastics is available for the foam materials themselves, but not for sandwich structures with foam cores. Tests were conducted to evaluate the compressive strength of sandwich panels at room and elevated temperatures. The test specimens were prepared with epoxy pre-preg fiberglass laminate; AMS 4901 titanium, and 2024-T81 aluminum alloy face skins. The decrease of failing face skin compressive stress sustained by the specimens as the test temperature was increased above room temperature, and the tendency of the core material to char and partially melt at 400F and above, indicate that the foamed product tested is not a satisfactory core material for high temperature aircraft structures. (Author)

AD-431 516 Div. 14
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
EVALUATION OF EC-766 SR AT TEMPERATURES BELOW ROOM TEMPERATURE.
Final rept.,
by J. Swafford. 10 Mar 64, 8p. Rept. no. A486
Contract AF33 657 11215
Unclassified report

Descriptors: (*Coatings, Viscosity), (*Films, Viscosity), (*Aircraft finishes, Viscosity), Aircraft panels, Viscosity, Thickness, Weight, Temperature, Tests.

This test was conducted to determine (1) the viscosity of EC766SR at 50, 60, 70 and 77F, and (2) the effect of viscosity variation as caused by temperature on the film thickness of EC776SR dip applied to aluminum panels. The viscosity of EC776SR varied from 304 to 480 CPS and the total film thickness varied from 0.001 to 0.002 inches resulting in an average film weight change of approximately 30%. (Author)

AD-431 517 Div. 14
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
EVALUATION OF SUPER KOROPON AIRCRAFT PRIMER SURFACER.
Final rept.
10 Mar 64, 5p. Rept. no. A488
Contract AF33 657 11215
Unclassified report

Descriptors: (*Aircraft finishes, Paint primers), (*Paint primers, Aircraft finishes), (*Airplane panels, Paint primers), Epoxy plastics, Polyester plastics, Coatings, Processing, Tests.

This test was initiated to determine if Super Koropon Primer Surfacer can be overcoated with MMS-405 Epoxy Enamel, and to establish the approximate drying time which will permit sanding to a smooth finish. The Primer Surfacer was prepared by mixing four volumes of 513-009 paste to one volume of 910-077 curing solution. Two coats were applied, approximately .003-inch thick, allowing 30 minutes for drying between coats. The panel could be sanded in one hour; however, the primer was not completely cured. After sanding the primer to a smooth finish, two more coats were applied as described above. The primer was dried, cured, and sanded. There was no damage to any panel by the wet or dry tape tests, nor any film degradation due to exposure to 300F. The drying time is dependent upon the thickness. A thin coat of approximately .003-in. can be sanded in one hour. (Author)

AD-431 528 Div. 14, 26
OTS price $1.60

Picatinny Arsenal, Dover, N. J.
NITROCELLULOSE PAPER COMBUSTIBLE MANDRELS,
by Edward Daniels and David Eliezer. Feb 64, 17p.
PA TM1324 Unclassified report

Descriptors: (*Mandrels, Paper), (*Paper, Mandrels), (*Nitrocellulose, Paper), Flammability, Combustion, Propellant grains, Casting, Solid rocket propellants, Manufacturing methods Rocket motors (Solid propellant), Captive tests.

Satisfactory combustible mandrels were fabricated by convolutely wrapping nitrocellulose paper on a cylindrical form using a lacquer to bond the layers of paper. A modified M8 JATO propellant grain was successfully cast around one of these mandrels and statically fired with satisfactory results. (Author)

AD-431 544 Div. 14
OTS price $2.60

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
CERAMIC SYSTEMS FOR MISSILE STRUCTURAL APPLICATIONS.
Quarterly rept. no. 5, 1 Nov 63-31 Jan 64,
by N. E. Poulos, J. N. Harris and J. D. Walton, Jr. 31 Jan 64, 27p.
Contract NOw63 0143d
Unclassified report

Descriptors: (*Ceramic materials, Panels (Structural)), (*Guided missiles, Structures), Particles, Heat resistant materials, Sintering, Colloids, Gels, Aluminum compounds, Oxides, Hydroxides, Sulfates, Refactory materials, Sintering furnaces, Sheets, Sand, Fibers (Natural), Wood, Fibers (Synthetic), Hypersonic test vehicles, Impregnation.

The effects of type of wood fiber, ratio of wood fiber to refractory particulate material and ratio of coarse to fine particles of particulate material in the compact were studied using two firing schedules and two types of suspending and binding systems. The suspending and binding systems were; an organic system (corn starch) whose final products would burn out on firing in an oxidizing atmosphere; and an inorganic system (aluminum chlorhydroxide) whose final products after firing would be the same as the refractory particulate material in the compact. The organic binder proved to be more effective than the inorganic binder. It provided more rapid drain times in felting, higher green densities and better sintering at 2500 F. (Author)

AD-431 603 Div. 14, 26
OTS price $3.50

Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
FLUIDIZED-BED COATING WITH PLASTICS; TECHNOLOGY AND POTENTIAL FOR MILITARY APPLICATIONS,
by Arthur H. Landrock. Jan 64, 223p. Rept. no. 13
Unclassified report

Descriptors: (*Plastic coatings, Manufacturing methods), (*Manufacturing methods, Plastic coatings), Processing, Production, Corrosion inhibition, Electric insulation, Lubrication, Sources, Industrial equipment, Bibliographies, Abstracts, Indexes, Patents.

This report on the relatively new field of fluidized-bed coating with plastics is intended to give military agencies and contractors a good idea of the possibilities and limitations of the technique. In the normal use of the process a metal part is heated to a temperature somewhat higher than the melting point of the resin powder with which it is to be coated. Upon immersion of the preheated metal part into a bed or bath of resin powder, usually kept at room temperature and fluidized by a current of air, the powder particles are fused onto the surface of the part. Postheating may or may not be necessary to smooth and/or cure the coating. This report has detailed information on 139 references, including 39 foreign and American patents. (Author)

AD-431 615 Div. 14, 25
OTS price $4.60

Honeywell Research Center, Hopkins, Minn.
THE MECHANICAL BEHAVIOR OF MAGNESIUM OXIDE AT HIGH TEMPERATURES,
by E. B. Day and R. J. Stokes. Jan 64, 48p.
Rept. no. HR64 253
Contract AF33 616 7465
Unclassified report

Descriptors: (*Magnesium compounds, Oxides), (*Oxides, Mechanical properties), (*Single crystals, Magnesium compounds), High temperature research, Deformation. Fracture (Mechanics), Plasticity, Crystal lattice defects, Crystal structure, Stresses, Strain (Mechanics), Ceramic materials, Etched crystals, Creep, Symmetry (Crystallography).

Magnesium oxide crystals show a wide variety of deformation and fracture modes under tension at high temperatures depending on the number of slip systems operating concurrently in a given volume. At low temperatures slip is confined to a single <110> (110) system and plasticity is limited by stress concentrations which develop where slip switches from one plane to another. At intermediate temperatures <110> (110) slip systems at 90 degrees to each other can interpenetrate but those at 60 degrees cannot. At high temperatures dislocations can interpenetrate on all systems and polygonization can occur. After easy glide the crystals work harden and elongate over 100 percent before fracturing in a completely ductile manner. The transition from one mode to another depends on strain rate. The relative ability for 90 or 60 degree systems to intersect is discussed in terms of dislocation interactions. (Author)

AD-431 679 Div. 14, 25
OTS price $2.60

Centre National D'Etudes Des Telecommunications (France).
RESEARCH ON VITREOUS LASER MATERIALS.
Final technical rept. 1 Jan-31 Dec 63.
31 Dec 63, 23p.
Contract DA91 591EUC2793
Unclassified report

Descriptors: (*Lasers, Materials), Glass, Impurities, Neodymium, Phosphates, Fluorides, Phase studies, Beryllium, Density, Refractive index, Measurement, Absorption spectrum, Rare earths, Single crystals, Barium, Silicates, Oscillators, Phosphate glass, Spectrophotometers.

A systematic study was made of vitreous materials which would possibly exhibit better performances in laser action than the silicate, borate and boro-silicate glasses which are studied by many workers. About 150 samples were prepared of phosphate and fluoride glasses of different composition, doped, in general, with 2% of neodymium by weight. Neodymium doping was chosen because it has a four level energy system and therefore exhibits Laser action at room temperature. Series of simple alkaline phosphate glasses of different mole ratios had been prepared, as well as series of bivalent cation phosphate glasses, equally of different mole ratios. The influence of fusion.time and temperature had been studied by preparing different samples of a phosphate glass of the same composition, at different fusion temperatures and for different fusion times. In order to investigate the influence of the neodymium concentration on the optical properties, a series of phosphate glass of a given composition had been doped with various quantities of neodymium. (Author)

AD-431 776 Div. 14, 17
OTS price $1.60

IIT Research Inst., Chicago, Ill.
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS.
Bimonthly rept. no. 2, 1 Dec 63-31 Jan 64,
by Larry I. Kane and John J. Rausch. 28 Feb 64,
12p. Rept. no. B6019 2
Contract NOw64 0140c
Unclassified report

Descriptors: (*Vanadium alloys, Silicon coatings), (*Niobium alloys, Protective treatments), (*Protective treatments, Vanadium alloys), Oxidation, Corrosion inhibition, Heat treatment, Coatings.

The influence of the pack-siliconizing coating and the coating process on the mechanical properties of V-60 wt. % Cb-1 wt. % Ti is under investigation. Preliminary results show that no hardening of the substrate of 0.050 in. coated sheet occurs after twenty-five 4-hr static air oxidation cycles at 2000 F. The pack siliconizing process has been modified to eliminate potential sources of interstitial contamination of the alloys during the coating process. Results indicate that the coated materials produced under these conditions in all cases have a ductile-to-brittle transition temperature below room temperature. Work has also been initiated in the development of an oxidation resistant slurry or liquid cementation type coating for vanadium-columbium alloys. (Author)

AD-431 798 Div. 14
OTS price $.50

Naval Research Lab., Washington, D. C.
THERMAL SHOCK STUDIES OF CERAMIC MATERIALS.
Interim rept.,
by K. McKinney and H. Smith. 30 Dec 63, 12p.
NRL 6029 Unclassified report

Descriptors: (*Ceramic materials, Thermal stresses), Fracture (Mechanics), Aluminum compounds, Oxides, Glass, Boron compounds.

A test method has been developed and used at the U. S. Naval Research Laboratory for comparing the thermal shock characteristics of several ceramic materials. The method is simple and inexpensive, making use of a circular disk of ceramic material containing a central hole. Thermal stresses are imposed by heating the inside of the central hole with a methane-oxygen torch. Thermocouples, placed at different distances from the central

hole, give one information on temperature versus time for various torch flame temperatures. Additional information may be obtained on crack velocities in each material by painting concentric silver strips on the disk surfaces. By connecting each strip to an oscilloscope, one may follow the path of the fracture as the crack progresses across the plate. Comparative thermal shock data were obtained for two types of alumina, a crystalline glass, and a borosilicate glass. Information obtained through these studies will be used in an attempt to correlate fracture toughness with various thermal shock parameters. (Author)

AD-431 818 Div. 14
OTS price $3.60

Surface Lab., Mass Inst. of Tech., Cambridge.
FRICTION AND WEAR AT ELEVATED TEMPERATURES,
by Ernest Rabinowicz, Masaya Imai and Victor Santos. Dec 63, 37p.
Contract AF33 616 7648, Proj. 7350, Task 735001
RTD TDR63 4272, pt. 5
Unclassified report

Report on Refractory Inorganic Nonmetallic Materials.

Descriptors: (*Friction, High-temperature research), (*High-temperature research, Wear resistance), (*Metal coatings, Friction), (*Metal films, Friction), Test equipment, Steel, Copper, Lead, Chromium, Nickel, Electroplating, Silver compounds, Chlorides, Molybdenum alloys, Nickel alloys, Chromium alloys, Zinc.

Friction measurements were carried out as a function of temperature using solid surfaces covered by various solid films. The films included a soft metal (lead) and two hard metals (nickel and chromium) applied in various thicknesses, oxide coatings produced naturally by high temperature oxidation of Hastelloy alloys, and a silver coating produced continuously by electrodeposition during sliding. The effectiveness of these coatings depends in a rather complex way on their thickness, their adhesion, and the difference in strength between them and their substrates. (Author)

AD-431 864 Div. 14, 17
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
EFFECT OF CERAMIC COATINGS ON 321 STAINLESS STEEL,
by J. Krieg. 10 Mar 64, 8p. Rept. no. A489
Unclassified report

Descriptors: (*Ceramic coatings, Stainless steel), (*Stainless steel, Ceramic coatings), Heat treatment, Lead compounds, Monoxides, Boron compounds, Oxides, Sulfides, Metallography.

The purpose of this investigation was to determine if lead sulfide-boric oxide and lead monoxide-silica coatings caused any deleterious effects to metal substrates in the temperature range of 1200 to 1400 F. The substrate material consisted of six panels of 321 stainless steel measuring 2 x 2 x .05 in. After six hours exposure at 1200 and 1300 F, neither the lead sulfide-boric oxide and the lead monoxide-silica coated specimens showed no deleterious effects at the coating-substrate interface. After six hours exposure at 1400 F, however, the lead sulfide-boric oxide and the lead monoxide-silica coated specimens showed a slight intergranular attack on the 321 stainless steel substrate. (Author)

AD-431 873 Div. 14
OTS price $1.60

Shell Development Co., Emeryville, Calif.
BEARING LUBRICATION UNDER SEVERE CONDITIONS.
Bimonthly progress rept. Dec 63-Jan 64.
29 Feb 64, 20p. Rept. no. S13910
Contract NOw63 0466C
Unclassified report

Descriptors: (*Lubrication, Ball bearings), (*Ball bearings, Lubrication), High temperature research, Friction, Test methods, Time, Temperature, Wear resistance, Contamination, Mathematical analysis.

The possibility of obtaining bearing failure (high bearing deposits) by prolonged bearing operation with an increased oil sump charge was investigated during this period. Increasing the lubricant charge from two gallons to five gallons did not result in bearing failure with a MIL-L-7808E lubricant operating in the 35mm ball bearing rig at 500 F lubricant-in temperature. Failure by loss of lubricant was obtained as in all previous tests with various lubricants. Increasing the lubricant charge increased the total operating time from 36-1/2 hours (148 passes) to 114-1/4 hours (224 passes) but there was practically no difference in the operation of the bearing. For a system which fails by loss of lubricant two equations are derived which relate initial lubricant charge, termination lubricant charge, lubricant recovery rate, and lubricant flow rate with total operating time and number of lubricant passes. The experimental values of time and number of passes for the current tests are in excellent agreement with values predicted by the derived expressions. A heated dual-tank reservoir to investigate the effect of operating with a high bulk oil temperature was built and is presently in operation. (Author)

AD-431 965 Div. 14
OTS price $1.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
EVALUATION OF PRESSURE-SENSITIVE ADHESIVE TAPES FOR USE WITH BLUE 4 A/B,
by H. Theodore Young and Llewellyn Hagenbuch.
Feb 64, 17p.
AED TR3100 Unclassified report

Descriptors: (*Adhesive tapes, Environmental tests), (*Aluminum, Adhesive tapes), Storage, Heat, Humidity, Polyester plastics, Foils, Pressure, Sensitivity.

Various commercially available tapes covered by government specifications were analyzed for use as an environmental seal on an anodized aluminum surface. Polyester film, pressure-sensitive adhesive tape and aluminum foil pressure-senitive adhesive tape were selected for testing as applied to the end item. (Author)

AD-431 996 Div. 14
OTS price $1.60

New York State Coll. of Ceramics, Alfred U.
THE STRESS-STRAIN BEHAVIOR OF STRONTIUM ZIRCONATE.
Bimonthly progress rept. no. 2, 15 Nov 63-15 Jan 64,
by J. E. Funk, J. Nemeth and J. R. Tinklepaugh.
15 Jan 64, 19p.
Contract NOw64 0051d
Unclassified report

Descriptors: (*Strontium compounds, Zirconates), (*Mechanical properties, Strontium compounds), Stresses, Strain (Mechanics),

Crystal structure, X ray photography, Sintering, Crystal growth.

It is conceivable that the crystal structure of strontium zirconate might provide a clue to the understanding of the stress-strain behavior of the material and for that reason considerable time has been expended in careful X-ray analysis of all materials used in experiments. Efforts to sinter C. P. strontium zirconate were not successful. The reasons for this are being investigated. Single crystals of strontium zirconate are badly needed and efforts have continued to grow these by precipitation from low melting salts. (Author)

AD-432 051 Div. 14
OTS price $1.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
BALLISTIC PROTECTIVE BUOYANCY MATERIALS.
Quarterly rept. no. 15, 1 July-30 Sep 63,
by M. C. Jaskowski. 30 Sep 63, 16p.
Contract N140 138 72793B, Proj. 4388 4
Unclassified report

Descriptors: (*Acrylic resins, Fibers (Synthetic)), (*Buoyancy, Materials), (*Textiles, Buoyancy), Silicone plastics, Moistureproofing.

Both the buoyant and ballistic effectiveness of felts prepared from the 1.0 denier acrylic staple fibers which had been commercially pre-hydrophobed were evaluated in the laboratory. Compartmented felts of the pre-hydrophobed 1.0 denier acrylic fibers were prepared on a commercial scale by several textile processors. (Author)

AD-432 121 Div. 14
OTS price $1.10

Defense Metals Information Center, Columbus, Ohio.
REVIEW OF RECENT DEVELOPMENTS. FIBER-REINFORCED MATERIALS,
by H. J. Wagner. 6 Dec 63, 3p.
Unclassified report

Descriptors: (*Composite materials, Mechanical properties), (*Ceramic fibers, Composite materials), (*Reinforcing materials, Ceramic fibers), Aluminum compounds, Oxides, Iron, Stresses, Silver, Tensile properties, High-temperature research, Beryllium, Aluminum, Glass textiles, Stainless steel, Extrusion, Dies.

AD-432 138 Div. 14
OTS price $1.60

Aeon Labs. (Gt. Brit.).
THE STRUCTURE OF GRAPHITIC MATERIALS.
Quarterly technical summary rept. no. 3,
1 Aug 62-1 Oct 63.
22 Oct 63, 17p.
Contract DA91 591EUC1851, Proj. 01 7796 61
Unclassified report

Descriptors: (*Graphite, Crystal structure), Electron microscopy, Electron diffraction analysis, Creep, Heat treatment.

During the reporting period arrangements have been made to obtain a supply of a synthetic graphite material manufactured from petroleum coke and a small proportion of natural graphite with a pitch binder. This is supplied by the manufacturers in 2 conditions designated C.Y.9. and E.Y.9., the latter being in the 'graphitised' form (heated at 2,500 C). The two types of material are being examined following various heat treatments and creep tests using transmission electron microscopy. Transmission specimens have been prepared by (a) replication of fracture surfaces and (b) erosion of 3mm discs cut from 0.5mm thick sheet by a miniature sand blasting unit. (Author)

AD-432 247 Div. 14
OTS price $4.60

Forest Products Lab., Madison, Wis.
A STUDY OF THE STRENGTH OF SHORT AND INTERMEDIATE WOOD COLUMNS BY EXPERIMENTAL AND ANALYTICAL METHODS,
by John E. Parker. Jan 64, 45p.
FPL 028 Unclassified report

Master's thesis.

Descriptors: (*Wood, Stresses), Loading (Mechanics), Strain (Mechanics), Buckling (Mechanics), Differential equations.

Wood columns of various lengths in two species were evaluated for strength and the results analyzed by several methods. Experimental stress-strain data were obtained over a 6-inch gage length from specimens 10 inches in length. The data thus obtained were used to predict buckling loads given by the tangent modulus theory. In one species, the average experimental results for short and intermediate columns of the grade used agreed very closely with the tangent modulus predictions. In the other species, average experimental results went above tangent modulus predictions for the short columns and below for the intermediate columns. Several analytical approximations were developed to predict tangent modulus buckling loads. The Ramberg-Osgood equation for stress versus strain and Timoshenko's equation for tangent modulus versus strain yielded satisfactory results. A hyperbolic equation for stress versus strain did not yield satisfactory results. The approximate theoretical tangent modulus buckling loads of the columns with L/d equal to 15 and 20 were determined by Southwell's method. The results that were obtained by Southwell's method agreed very closely with theory for intermediate columns of one species, but were too high for intermediate columns of the other species. (Author)

AD-432 248 Div. 14, 26
OTS price $1.10

Forest Products Lab., Madison, Wis.
PULP YIELDS FOR VARIOUS PROCESSES AND WOOD SPECIES.
Feb 64, 6p.
FPL 031 Unclassified report

In cooperation with Wisconsin U., Madison.

Descriptors: (*Wood pulp, Processing), (*Processing, Wood pulp), (*Paper, Wood pulp), Tables, Production, Wood.

Density, fiber length, and typical pulp yields, as obtained primarily by kraft and sulfite processes, from many softwood and hardwood species grown in the United States are tabulated. The yield of pulp (expressed as a percentage by weight on the moisture-free basis) obtained by digesting wood by one of the chemical processes is dependent to a large extent on the chemical composition of the wood. A notable difference between softwoods and hardwoods is observed in their fiber length. In general, softwoods produce longer fibered pulps than hardwoods and are preferred for most kinds of paper for this reason. The fiber length, among other structural characteristics of fibers, has an influence on the strength and other properties of the pulp and of the paper in which the pulp is used. (Author)

AD-432 258 Div. 14, 13
OTS price $3.60

Forest Products Lab., Madison, Wis.
EDGEWISE COMPRESSIVE BUCKLING OF FLAT SANDWICH PANELS: LOADED ENDS SIMPLY SUPPORTED AND SIDES SUPPORTED BY BEAMS,
by John J. Zahn and Shun Cheng. Feb 64, 35p.
FPL 019 Unclassified report

In cooperation with Wisconsin Univ., Madison, Contract AF33 657 63 358.

Descriptors: (*Sandwich panels, Buckling (Mechanics)), Loading (Mechanics), Compressive properties, Sandwich construction, Differential equations, Flat plate models, Boundary value problems.

Flat sandwich panels with equal isotropic facings and orthotropic or isotropic cores, under edge compression, are analyzed. The loaded panel ends are assumed to be simply supported and the sides are hinged to simple beams that carry end load. Curves of buckling coefficients are presented for sandwich with isotropic core. (Author)

AD-432 259 Div. 14, 25
OTS price $1.60

Forest Products Labs., Madison, Wis.
SHORT-COLUMN COMPRESSIVE STRENGTH OF SANDWICH CONSTRUCTIONS AS AFFECTED BY SIZE OF CELLS OF HONEYCOMB CORE MATERIALS,
by C. B. Norris. Jan 64, 15p.
FPL 026 Unclassified report

In cooperation with Wisconsin U., Madison, Contract AF33 657 63 358. Revision of Rept. no. 1817, AD-53 946.

Descriptors: (*Sandwich construction, Composite materials), (*Wood, Honeycomb cores), (*Paper, Honeycomb cores), (*Aluminum alloys, Sheets), (*Sandwich panels, Compressive properties), Beams (Structural), Buckling (Mechanics), Metal plates, Bonding, Phenolic plastics, Stresses, Strain (Mechanics), Thickness, Loading (Mechanics), Deflection, Experimental data, Test methods.

To determine the effect of honeycomb core cell size on edgewise compression of sandwich constructions, sandwich specimens were evaluated that had aluminum facings of various thicknesses and a solid core of Sitka spruce in which a cell of a honeycomb core material was simulated by a round hole. A few tests involving honeycomb cores were made, and results of these were found to agree with those of the other tests for the stress at the start of dimpling of the facings. The maximum stress in the facings of the honeycomb core specimens was lower at failure than for the specimens with wood cores. At failure, the honeycomb core sandwich specimens had a wrinkle-type failure in the facing, with some failure in the bond between the facing and core. An empirical formula was obtained that can be used to estimate the critical stress at which dimpling of the facing over the cell voids begins. (Author)

AD-432 267 Div. 14
OTS price $2.60

Forest Products Lab., Madison, Wis.
COMPARISON OF WOOD PRESERVATIVES IN MISSISSIPPI POST STUDY.
Annual progress rept. for 1964,
by J. Oscar Blew, Jr. and John W. Kulp. Feb 64, 23p.
FPL 01 Unclassified report

In cooperation with Wisconsin U., Madison.

Descriptors: (*Protective treatment, Wood), (*Wood, Preservation), (*Preservation, Wood), Oils, Petroleum, Boric acids, Copper compounds, Sulfates, Sodium compounds, Arsenic compounds, Zinc compounds, Salts, Creosote, Chromates, Chlorides, Fluorine compounds, Environmental tests, Failure (Mechanics), Life expectancy, Polycyclic compounds, Aromatic compounds, Phenols, Tables.

Experimental untreated southern yellow pine posts installed from 1936 to 1938 at the Harrison Experimental Forest, Saucier, Miss., had an average life of 3.3 years. Untreated longleaf pine posts installed in 1949 had an average life of 2.3 years, while those treated with a No. 2 fuel oil and with Wyoming residual petroleum oil have an estimated average life of 5 and 8 years, respectively. Of southern yellow pine posts installed from 1936 to 1941, those treated with borax-boric acid all failed with an average life of 10.6 years. Posts treated with the following preservatives and installed from 1936 to 1941 have had failures totaling 10% or less of the number installed and should last 43 years or longer on an average: Pentachlorophenol, 4.8% in crankcase oil; copper sulfate and sodium arsenate applied by double diffusion; and zinc meta arsenite. (Author)

AD-432 276 Div. 14, 25
OTS price $8.10

New York State Coll. of Ceramics, Alfred U.
ELASTIC PROPERTIES OF MAGNESIA AND MAGNESIUM-ALUMINATE SPINEL.
Final summary rept.,
by D. H. Chung, G. R. Terwilliger, W. B. Crandall and W. G. Lawrence. 29 Feb 64, 89p.
Contract DA31 124ARO D23
AROD 2891 12 Unclassified report

Descriptors: (Magnesium compounds, Elasticity), (*Spinels, Elasticity), (*Aluminum compounds, Magnesium compounds), Oxides, Aluminates, Anisotropy, Single crystals, Crystals, Measurement, Temperature, Porosity, Density, Chemical analysis, X-ray diffraction analysis, Crystal lattices, Crystal structure, Thermal expansion, High temperature research, Low temperature research.

The elastic moduli for single-crystal magnesium oxide were evaluated for the temperature range of 80 to 1600 K. The isotropic Young's modulus and shear modulus of dense-formed polycrystalline magnesia were measured over the temperature range of 298 to 1600 K. The data on the single-crystal elastic constants were compared with the measured polycrystalline isotropic moduli on the basis of the Voigt-Reuss-Hill approximation. Dense-formed specimens of magnesium-aluminate spinel with varying mole ratios of magnesia to alumina were prepared under controlled conditions. The room temperature values of the elastic moduli spinel compositions having 1:1, 1:2, 1:2.65, 1:3, and 1:3.5 mole ratios. Young's modulus as a function of temperature was determined for the spinels having compositions of 1:1, 1:2.65, and 1:3.5 mole ratios of magnesia to alumina. The results are discussed with respect to the effects of porosity, composition, and temperature. (Author)

AD-432 299 Div. 14, 25
OTS price $2.60

Forest Products Lab., Madison, Wis.
COMPARISON OF BLOCK SHEAR METHODS FOR DETERMINING SHEARING STRENGTH OF SOLID WOODS,

by Howard C. Hilbrand. Feb 64, 25p.
FPL 030 Unclassified report

In cooperation with Wisconsin U., Madison.

Descriptors: (*Wood, Mechanical properties), (*Test methods, Shear stresses), Test equipment, Standards, Moisture, Density, Experimental data, Statistical analysis.

Information concerning the relative magnitudes of shear strength as determined by using cube-shaped or notched specimens in roller or nonroller testing apparatus has often been contradictory. This describes a comparative study, conducted at the U. S. Forest Products Laboratory and the Australian C.S.I.R.O. Division of Forest Products on six different specimen-apparatus combinations using matched specimens of southern yellow pine and overcup oak. Several of the combinations yielded estimates of shear strength that were significantly different, but standard deviations of shear strength were generally independent of the test method. Significant interaction of growth ring orientation and test type was apparent and may have contributed to previous conflicting views. In general, cube specimens yielded higher estimates of shear strength than notched specimens, and nonroller apparatus yielded higher estimates than roller-equipped apparatus. (Author)

AD-432 302 Div. 14
OTS price $2.60

Forest Products Lab., Madison, Wis.
FATIGUE STRENGTH OF PHENOLIC LAMINATES FROM 1 TO 10 MILLION CYCLES OF REPEATED LOAD,
by G. H. Stevens. Jan 64, 29p.
FPL 027 Unclassified report

In cooperation with Wisconsin Univ., Madison, Contract AF33 657 63 358.

Descriptors: (*Phenolic plastics, Fatigue (Mechanics)), (*Laminated plastics, Fatigue (Mechanics)), (*Glass textiles), Failure (Mechanics)), Loading (Mechanics), Compressive properties, High temperature research, Tensile properties, Mechanical properties.

Fatigue strength is presented of phenolic laminates 1/4, 1/8, and 1/16 inch in thickness under repeated load. Laminates were of CTL-91LB phenolic resin reinforced with 181-A1100 glass fabirc. Fatigue strength values were determined by applying axial loads parallel to the wary direction of the glass fabric reinforcement at 5, 25, and 900 cycles per minute and at mean stress levels of zero pounds per square inch, 25 and 50 percent of the compression control strength, and at 50 percent of the tension control strength. Specimens were evaluated at 73, 400, 500, 600, and 800 F. Results are presented in tables, and S-N curves (Maximum applied stress versus number of cycles to failure). (Author)

AD-432 305 Div. 14, 30
OTS price $1.10

Forest Products Lab., Madison, Wis.
METHODS USED AT THE FOREST PRODUCTS LABORATORY FOR PREPARING CROSS SECTIONS OF PAPER AND PAPERBOARD,
by Richard A. Horn and S. C. Ellickson. Jan 64, 9p.
FPL 022 Unclassified report

Descriptors: (*Paper, Microstructure), (*Microstructure, Paper), (*Fiberboard, Paper), Test methods, Fibers, Preparation, Films.

Method for preparing cross sections of paper are discussed and related to the type of study each would be appropriate for. Nonembedding methods as well as embedding techniques discussed include free hand nonembedding, microtome nonembedding and microtome embedding procedures. Embedding methods have the disadvantage of being tedious and requiring a considerable amount of time, apparatus, and technical skill in operation Because of these disadvantages, it is advisable first to determine whether the analysis of a sample would require such lengthy procedures. For the most part, the freehand and nonembedding techniques are simple, require little technical skill and apparatus, and usually will give the information desired. (Author)

AD-432 311 Div. 14, 30
OTS price $4.60

Forest Products Lab., Madison, Wis.
INVESTIGATION OF METHODS FOR EVALUATING UNWOVEN GLASS-FIBER-REINFORCED PLASTIC LAMINATES IN FLEXURE,
by Karl Romstad. Feb 64, 41p.
FPL 024 Unclassified report

Incooperation with Wisconsin Univ., Madison, Contract AF33 657 63 358.

Descriptors: (*Laminated plastics, Test methods), (*Glass textiles, Test methods), (*Fibers (Synthetic), Test methods), Epoxy plastics, Mechanical properties, Rupture, Failure (Mechanics), Shear stresses, Compressive properties, Loading (Mechanics), Mathematical analysis.

Three plastic laminates reinforced with unwoven, unidirectional glass fibers were evaluated over varying spans under both midpoint and two-point loading improve accepted flexure test procedures for these materials. Also investigated were the effects of radius of loading nose, length of overhang, and different two-point loading systems on properties of 1/8-inch laminates. Results of these evaluations indicated that present test methods often result in failures that do not accurately evaluate the outer fiber strength of the material. Horizontal shear failures could be eliminated by using a specimen with a span-depth ratio greater than 16. Forr a long specimen, a correction factor must be applied to the conventional moment expression to include the effect of horizontal components of force at the reaction supports. Compression failures beneath the load points were eliminated either by using a 0.01-inch-thick metal plate beneath a loading nose of 1/8-inch radius, increasing the loading nose radius, or increasing the specimen span-depth ration. (Author)

AD-432 322 Div. 14
OTS price $3.60

Borden Co., Philadelphia, Pa..
REINFORCED HIGH TEMPERATURE ELASTOMERS.
Final rept., Sep 62-Sep 63,
by K. C. Tsou, S. J. Makower, R. N. Goldey and B. D. Halpern. Sep 63, 32p.
Contract DA36 034AMC3791W
Unclassified report

Descriptors: (*Elastomers, Heat-resistant materials), (*Silicon compounds, Dioxides), (*Additives, Synthetic rubber), (*Reinforcing materials, Additives), Talc, Silanes, Chlorine compounds, High-temperature research, Silicone plastics, Aromatic compounds, Polymers, Esters, Tensile properties, Elasticity, Hardness, Fibers, Stability, Heat, Siloxanes, Moisture-proofing.

Filler-rubber systems containing various chemical modifications of silica and fibrous talc as fil-

lers, have been evaluated at 500 F. after aging at 500 F. Trimethylsilyl (TMS) silicas are more suitable than triphenyl silicas. Fibrous grades of talc were superior as non-reinforcing fillers. Best improvement was obtained with combination of TMS silica and fibrous talc modified by chlorosilanes. Additional incorporation of vinyl chlorosilane approved high temperature elongation. (Author)

AD-432 324 Div. 14
OTS price $.50

Rock Island Arsenal Lab., Ill.
HIGH TEMPERATURE, NON-REFLECTIVE EROSION RESISTANT ALUMINUM FINISH,
by J. Knanishu. 26 Nov 63, 16p.
Proj. 1A0 13001A039
RIAL 63 3894 Unclassified report

Descriptors: (*Coatings, Camouflage), (*Dyes, Reflection), (*Light, Stability), Aluminum alloys, Pickling, Pickling compositions, Acids, Fluorides, Ammonium compounds, Lead compounds, Potassium compounds, Acetates, Chromates, Sulfides, Anodes (Electrolytic cell), Colors.

A number of soluble inorganic compounds were used in reactions to deposit insoluble colored precipitates (pigments) in the pores of anodized aluminum alloys. Many colors and shades were obtained by using the variables of time of immersion, temperature and concentrations of the coloring solutions. The effects of the alloying constituents were observable in the colors obtained. There is a notable scarcity of inorganic compounds which can be used to produce a black or olive drab color on anodized aluminum. Alundum blasting improves variability and depth of colors. By proper control of the hard anodize process, excellent shades of light-fast, nonreflective olive drab colors can be produced. (Author)

AD-432 339 Div. 14, 9
OTS price $8.60

Mechanical Technology, Inc., Latham, N. Y.
A NUMERICAL SOLUTION TO THE THERMAL-ELASTOHYDRODYNAMIC LUBRICATION OF ROLLING AND SLIDING CYLINDERS,
by H. S. Cheng. 25 Feb 64, 99p. Rept. no. 64TR7
Contract Nonr372900
Unclassified report

Descriptors: (*Lubrication, Theory), (*Hydrodynamics, Lubrication), Numerical methods and procedures, Roller bearings, Friction, Elasticity, Fluid dynamic properties, Reynold's number, Films, Compressive properties, Energy, Differential equations, Partial differential equations, Numerical analysis, Integral equations, Viscosity, Surface temperatures, Temperature, Distribution, Mathematical models, Cylindrical bodies, Thickness.

Existing isothermal theories of elastohydrodynamic lubrication of rollers are extended to include the effects of temperature in the fluid and the solids due to heating from rolling, sliding and compression of the lubricant. The two dimensional finite difference method has been used in calculating the temperature in the fluid using local pressure-temperature dependent viscosity. Both the compressibility effect and the heat from compression of the lubricant are considered in the solution of the Reynolds and the energy equation. Two series of results were obtained. The first is a heavily loaded series intended to correlate with Crook's experimental results, and the second is a moderately loaded series intended to correlate with temperature measurements taken at this laboratory. These results show that temperature has a significant influence upon the shape of the pressure, film profile, but very little effect upon the magnitude of the film thickness in the contact zone. The frictional force is, however, strongly influenced by the temperature rise in the film. (Author)

AD-432 340 Div. 14, 25
OTS price $2.60

Mechanical Technology, Inc., Latham, N. Y.
ELASTOHYDRODYNAMIC LUBRICATION - EXPERIMENTAL INVESTIGATION,
by F. K. Orcutt. 27 Feb 64, 27p. Rept. no. 64TR6
Contract Nonr3729
Unclassified report

Descriptors: (*Lubrication, Hydrodynamics), (*Hydrodynamics, Lubrication), Instrumentation, Measurement, Heat, Pressure, Thermocouples, Transducers, Gears, Cams, Roller bearings, Sliding contacts.

The overall objective of this program is to improve the life, reliability and load capacity of concentrated contact machine elements such as rolling-element bearings, gears and cams. The chosen means of accomplishing this end are to investigate the fundamental process of lubrication in concentrated rolling-sliding contacts and seek, wherever possible, to relate the findings to the practical aspects of bearing, gear and cam performance. (Author)

AD-432 364 Div. 14, 4
OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
HEAT RESISTANT HYDRAULIC FLUIDS.
Final rept., 27 Nov 62-31 Dec 63,
by M. E. Hill, D. T. Carty and J. C. Butler.
15 Jan 64, 22p.
Contract NObs88248, Proj. SR001 03 01, SRI Proj. PRU4323, Task 0606
Unclassified report

Descriptors: (*Hydraulic fluids, Synthesis (Chemistry), (*Heat-resistant materials, Hydraulic fluids), Heat, Hydrolysis, Stability, Corrosion, Viscosity, Density, Flammability, Alcohols, Fluorine compounds, Esters, Carbonates, Chlorine compounds, Ethers, Aromatic compounds, Spectra (Infrared), Nuclear magnetic resonance.

Stanford Research Institute has been carrying on a program in synthessing and evaluating fluoroalcohol orthocarbonates and bis carbonates as fire-resistant fluids. A large part of the effort was concerned with a study of the preparation of the orthocarbonates and bis carbonates. Preliminary evaluation was done on a laboratory scale of physical properties such as viscosity, corrosivity, hydrolytic stability, flash point, fire point, and density. Two quarts each of bis (octafluoropentyl) carbonate, octafluoropentyl orthocarbonate, and bis (dodecafluoroheptyl) carbonate, one quart of dodecafluoroheptyl orthocarbonate, and 100 milliliters of dodecafluoroheptyl orthobenzoate were prepared for evaluation. (Author)

AD-432 365 Div. 14, 4
OTS price $5.60

IIT Research Inst., Chicago, Ill.
PREPARATION AND EVALUATION OF NEW HYDRAULIC FLUIDS.
Final rept. 28 Nov 62-27 Nov 63,
by Irvine J. Solomon. 20 Nov 63, 54p. Rept. no. C6001 12
Contract Nobs88249, Proj. C6001
Unclassified report

Descriptors: (*Hydraulic fluids, Synthesis (Chemistry)), (*Viscosity, Hydraulic fluids), Fluorine compounds, Organic sulfur compounds, Alkanes, Alkenes, Esters, Aromatic compounds, Spectra (Infrared), Nuclear magnetic resonance, Cyclohexanes, Cyclohexenes, S-heterocyclic compounds.

A number of new fluorine-containing materials were prepared and evaluated as hydraulic fluids. The compounds that were synthesized were selected in order to determine what structural characteristics were needed to improve the viscosity-temperature relationship. (Author)

AD-432 366 Div. 14, 4, 31
OTS price $10.10

Monsanto Research Corp., Dayton, Ohio.
FIRE RESISTANT HYDRAULIC FLUID FOR SUBMARINE USE.
Final rept. 15 May 62-14 Jul 63,
by E. S. Blake, R. E. DeBrunner and D. R. Dalton.
14 July 63, 121p.
Contract Nobs86749
Unclassified report

Descriptors: (*Hydraulic fluids, Synthesis (Chemistry), (*Performance (Engineering), Hydraulic fluids), Halogenated hydrocarbons, Submarines, Chlorination, Alkylation, Viscosity, Flammability, Compatibility, Polyester plastics, Sealing compounds, Seals (Stoppers), Synthetic rubber, Polyvinyl chloride, Electric insulation, Aromatic compounds, Ethers, Polycyclic compounds, Organic phosphorus compounds, Bromine compounds, Chlorine compounds, Fluorine compounds, Amines, Sulfur compounds, Sulfides, Phosphates, Esters, Phosphonic acids, Bromination, Ketones, Phenols, Nuclear magnetic resonance, Spectra (Infrared), Hydrocarbons.

Synthesis and evaluation data on five chemical classes as possible base stocks for fire-resistant hydraulic fluids for submarines are reported. The classes are: substituted polyaromatic ethers; halogenated amines; omega, omega'-bis (halophenyl) alkanes; sulfones; and phosphorus-containing compounds. They were evaluated for fire-resistance (as measured by autoignition temperature, 1300 F. molten metal test, flash-and fire points), thermal stability, fluid properties (including viscosity and fluid range), compatibility with alkyd base paints, O-ring Sealants and electrical conduit sheathing. (Author)

AD-432 367 Div. 14, 4
OTS price $4.60

Olin Mathieson Chemical Corp., New Haven, Conn.
DEVELOPMENT OF NONFLAMMABLE HYDRAULIC FLUIDS AND LUBRICANTS.
Final rept., Feb 62-July 63,
by E. H. Kober, H. F. Lederle and G. F. Ottmann.
1 Aug 63, 45p.
Contract NObs86482
Unclassified report

Descriptors: (*Hydraulic fluids, Synthesis (Chemistry)), (*Flammability, Hydraulic fluids), (*Lubricants, Performance (Engineering)), Fluorine compounds, Organic nitrogen compounds, Organic phosphorus compounds, Aromatic compounds, Spectra (Infrared), Stability, Hydrolysis, Compatibility, Rubber, Nuclear magnetic resonance, Ethers, Viscosity, Chlorination, Polymers.

The preparation and preliminary evaluation of a number of trimeric and tetrameric bis (alpha, alpha, omega -tri-H-polyfluoroalkyl) phosphonitrilates, mixed substituted trimeric and tetrameric (phenyl - alpha, alpha, omega-tri H-polyfluoroalkyl) phosphonitrilates, and mixed substituted trimeric and tetrameric (substituted phenyl-alpha, alpha, omega-tri H-polyfluoroalkyl) phosphonitrilates is described. Many products have wide liquid ranges with pour points ranging down to -55 F. They also have high compression ignition ratios and relatively high spontaneous ignition temperatures. Good lubricity and compatibility to rubber are other favorable properties. In order to obtain hydrolytically stable products, new synthesis and purification methods were developed. The compounds are promising candidates for potential use as non-flammable hydraulic fluids and lubricants. (Author)

AD-432 369 Div. 14
OTS price $8.10

Oklahoma U. Research Inst., Norman.
AGING OF CURE DATED ITEMS AND VARIOUS ELASTOMERIC COMPOUNDS.
Final rept.,
by Andrew Cosgarea, Jr., Robert K. Mortenson and Robert W. Vaughn. 30 Sep 63, 84p.
Contract AF34 601 14089, Proj. 1384 6
Unclassified report

Descriptors: (*Elastomers, Aging (Materials)), (*Synthetic rubber, Aging (Materials)), (*Aging (Materials), Elastomers), Elasticity, Hardness, Seals (Stoppers), Rubber seals, Tensile properties, Density, Compatibility, Vaporization.

Contents: Accelerated air aging studies on compound 822-60; accelerated air aging studies on compound 7866; accelerated aging studies on compound 822-60 totally immersed in storage oil; temperature retraction tests as an indication of aging; vaporization of volatile components in SR-822-60 rubber samples; infrared studies on constituents leached from Sr-822-60 rubber samples; vapor phase swelling tests on SR-822-60 rubber samples; and accelerated aging experiments with paracril-D and Hycar 1001 rubber stocks. (Author)

AD-432 383 Div. 14, 25
OTS price $1.00

Research and Technology Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ANALYSIS OF ALUMINA CRUCIBLE FAILURES IN THE PRESENCE OF NICKEL-COPPER-IRON ALLOYS.
Rept. for Apr 63-Sep 63,
by Robert Patton. Feb 64, 34p.
Proj. 7371, Task 737103
RTD TDR63 4159 Unclassified report

Report on Applied Research in Electric, Electronic, and Magnetic Materials.

Descriptors: (*Crucibles, Failure (Mechanics)), (*Aluminum compounds, Oxides), (*Stresses, Corrosion), Melting, Nickel alloys, Copper alloys, Iron alloys, Iron compounds, Oxygen, Analysis.

An unusual alumina crucible failure is analyzed and a mechanism postulated to account for the inordinately severe corrosion occurring near a localized region of high stress. The binary phase diagram of iron and oxygen is reviewed along with the pseudo binary of FeO-Al2O3 and the ternary phase relationship of Fe-Al-O at 1350 C. These data, along with other information, are used to suggest a reaction similar to stress corrosion in metals. (Author)

AD-432 388 Div. 14, 26
OTS price $1.60

Lexington Labs. Inc., Cambridge, Mass.
FEASIBILITY OF FORMING REFRACTORY FIBERS BY A CONTINUOUS PROCESS.

Quarterly progress rept. no. 3, 25 Aug-25 Nov 63, by William B. Campbell. 25 Nov 63, 15p.
Contract DA19 020AMC0068X, Proj. 59332008
AMRA CR63 03 3 Unclassified report

Descriptors: (*Refractory materials, Fibers), (*Fibers, Vapor plating), (*Crystal growth, Single crystals), Material forming, Aluminum compounds, Oxides, Nucleation, Epitaxial growth.

Methods for continuous formation of refractory fibers, or whiskers, by vapor phase growth are under investigation. The vapor phase processes are: (1) aluminum halide oxidation and (2) aluminum oxide reduction and recrystallization. Preliminary experimentation with the halide system at temperatures around 1200 C indicates that in order to obtain continuous fiber production, it is essential to (1) control the super-saturation, (2) control the temperature, and (3) probably provide suitable nuclei for crystal growth. (Author)

AD-432 446 Div. 14, 25, 8
OTS price $4.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
DIELECTRIC CONSTANT AND LOSS MEASUREMENTS ON HIGH-TEMPERATURE MATERIALS,
by W. B. Westphal. Oct 63, 47p.
Contract AF33 616 8353
Unclassified report

Descriptors: (*Dielectrics, Heat resistant materials), (*Ceramic materials, Dielectric properties), Measurement, Quartz, High temperature research, Oxides, Aluminum compounds, Beryllium compounds, Chromium compounds, Magnesium compounds, Tantalum compounds, Thorium compounds, Aluminates, Lanthanum compounds, Silicates, Yttrium compounds, Glass, Nitrides, Boron compounds, Radiofrequency, Microwave frequency, Silicon compounds, Electric bridges, Tuned circuits, Resonance, Test equipment (Electronics).

Measurement techniques for the frequency range 100 to about 2.5x10 to the 10th power are discussed for temperatures to 1650 C. These include the use of bridges, resonant circuits, standing-wave methods, and resonant cavities. Data on crystals of Al2O3, Cr2O3, MgO, LaAlO3, Y2O3; on multicrystalline bodies of Al2O3, BeO, MgO, Mg2SiO4, Ta2O5, ThO; on glass ceramics, silica glass, and BN are presented over smaller temperature and frequency ranges. Pyrolitic BN has a low loss tangent (0.0004 at 1375 C, 4.8x10 to the 9th power cps) and a low temperature coefficient of dielectric constant. Some aluminas and silicas exhibit loss tangents of ca. 0.0006 at 1000 C in the microwave region. Microwave losses are due partly to the charge transfer responsible for low-frequency conductivity and to the vibration spectra of infrared absorption. Both losses are increased by the addition of impurities. (Author)

AD-432 499 Div. 14
OTS price $.50

Princeton U., N. J.
AN INVESTIGATION OF METHODS OF USING A GRAPHITE RESISTANCE HEATER WITH AIR,
by I. E. Vas and S. M. Bogdonoff. Oct 63, 14p.
Contract AF33 657 8818, Proj. 7065, Task 7065 01
ARL 63 188 Unclassified report

Descriptors: (*Heaters, Graphite), Refractory coatings, Boron compounds, Nitrides, Hafnium compounds, Zirconium compounds, Carbides, High pressure research, High temperature research.

An investigation of the possibility of using a graphite heater as a basis for a air heating device showed that the three most promising materials to coat the graphite, boron nitride, hafnium carbide, and zirconium carbide, were not satisfactory. Other methods for heating air are suggested. (Author)

AD-432 500 Div. 14, 30
OTS price $.75

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
PROCEDURE FOR DETERMINING CRANKCASE OIL DILUTION,
by Maurice E. Le Pera. 30 Oct 63, 26p.
Proj. 1A0 24401A107
CCL 148 Unclassified report

Descriptors: (*Crankcases, Lubricants), (*Lubricants, Contamination), Determination, Fuels, Gasoline, Fuel oil, Water, Low temperature lubricants, Test methods.

A procedure for determining fuel and water dilution of crankcase oil was developed. The procedure is applicable for determining gasoline, compression-ignition-engine (CIE) fuel, diesel fuel, and water as diluents or contaminants in sub-zero lubricating oil MIL-L-10295A, and SAE grades 10W, 20, and 30. Test results on samples of known composition gave an accuracy of ± 1% on the sub-zero grade and ± 2% on grades 10W, 20, 30. Lubricating oil MIL-L-10295A contains approximately 5% of light fractions coming within the distillation range of motor fuels. (Author)

AD-432 503 Div. 14, 17
OTS price $1.25

Rock Island Arsenal Lab., Ill.
RUST REMOVING CORROSION PREVENTIVES - LITERATURE REPORT,
by Bernard J. Bornong. 27 Aug 63, 42p.
Proj. 1A0 24401A109
RIAL 63 2762 Unclassified report

Descriptors: (*Cleaning compounds, Materials), (*Corrosion inhibition, Materials), Acids, Bases (Chemistry), Abrasive blasting, Cleaning, Specifications, Periodicals, Patents, Tables, Reports, Bibliographies, Corrosion, Electrochemistry, Iron compounds, Oxides, Preservation, Solvents.

A survey of the literature on rust removal and prevention was conducted to (a) determine the status of materials used for these purposes and (b) consider the feasibility of developing a combination, readily removable, oil or solvent-soluble rust remover and preventive. At present no combination product of this type is available which is a completely effective rust remover and preventive. Products are available, however, which, during a suitable conditioning period, penetrate and loosen rust to make it more readily removable. These products also protect against corrosion. Development of a product which not only loosens rust, but also removes it, is the next logical step. It is recommended that such an attempt be made. Several areas for intensive study, which may aid in this development, are suggested. (Author)

AD-432 592 Div. 14, 4
OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
AN ABBREVIATION OF A QUANTITATIVE INFRA-RED METHOD FOR NITROCELLULOSE AND IT'S APPLICATION

TO ALKYD-NITROCELLULOSE LACQUERS,
by M. L. Adams. 10 Jan 64, 10p.
Proj. 1HO 24401A110 05
CCL 154 Unclassified report

Descriptors: (*Nitrocellulose, Infrared spectroscopy), (*Varnishes, Cellulosic plastics), Determination, Polyester plastics, Absorption spectrum.

Using the infra-red absorption band at 11.8 mu nitrocellulose is determined in acetone solutions of air dried alkyd-nitrocellulose lacquer vehicle films without separation of nitrocellulose or regard to color of the films. (Author)

AD-433 206 Div. 14
OTS price $4.60

Sperry Microwave Electronics Co., Clearwater, Fla.
INVESTIGATION OF LARGE SIGNAL MICROWAVE EFFECTS IN FERROELECTRIC MATERIALS.
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by G. A. Burdick and T. J. Lyon. Jan 64, 50p.
Rept. no. SJ230 0048 2
Contract DA36 039AMC03240E, Proj. IG6 22001A055 04
Unclassified report

Descriptors: (*Ferroelectric materials, Titanates), (*Titanates, Electrical properties), Microwaves, Microwave equipment, Dielectric properties, Barium compounds, Strontium compounds, Temperature, Microwave frequency, Complex compounds, Amino acids, Sulfates.

Theory and techniques for measurements of interest in this program are discussed briefly. Experimental results of measurements made on selected ferroelectrics are reported. These measurements include (1) insertion loss and phase shift as a function of sample thickness at 35 Gc, (2) dielectric constant as a function of temperature measured at 1 Kc, (3) transmission as a function of frequency from 26.5 Gc to 40 Gc, and (4) response to dc biasing fields at 35 Gc. For these measurements, four compositions of barium-strontium titanate ceramic were selected along with single crystal samples of triglycine sulfate. (Author)

AD-433 213 Div. 14
OTS price $1.00

Free U. of Brussels (Belgium).
VAPORIZATION OF COMPOUNDS AND ALLOYS AT HIGH TEMPERATURES,
by R. Colin, P. Goldfinger and M. Jeunehomme.
Feb 64, 36p.
Contract AF61 052 225, Proj. 7350, Task 735001
WADD TR60 782, pt. 21 Unclassified report

Report on Refractory Inorganic Non-Metallic Materials, Non-Graphitic.

Descriptors: (*Vaporization, Mass spectroscopy), (*Sulfides, Vaporization), Barium compounds, Calcium compounds, Strontium compounds, Thermochemistry, Dissociation, Molecules, Molecular properties.

CaS, SrS and BaS have been evaporated and the vapor analyzed by mass spectrometry. (Author)

AD-433 219 Div. 14
OTS price $1.10

Ohio State U. Research Foundation, Columbus.
NONDESTRUCTIVE SYSTEM FOR INSPECTION OF FIBER GLASS REINFORCED PLASTIC MISSILE CASES.
Quarterly rept. no. 5, 29 Jun-28 Sep 62,
by Merle Rhoten, Jay P. Mitchell and Robert C. McMaster. Dec 63, 8p.
Contract DA33 0190RD3670
WAL TR142 5 2 4 Unclassified report

Descriptors: (*Image tubes, Television cameras), (*Non-destructive testing, Radiography), (*Laminated plastics, Rocket cases), Glass textiles, Reinforcing materials, X-rays, Beryllium, Design.

The X-ray television imaging system is to be modified to operate in conjunction with a scan-conversion image storage system. Various available scan-conversion equipment have been studied and specifications for the purchase of scan-conversion and image storage equipment have been prepared. Research with slow-scan television equipment is being conducted and video signal storage using audio magnetic tape recording techniques have been accomplished. (Author)

AD-433 240 Div. 14, 25
OTS price $6.60

Aerojet-General Corp., Downey, Calif.
EXPERIMENTAL FRACTURE STUDIES AND EQUATION-OF-STATE MEASUREMENTS.
Final rept., June 62-Oct 62,
by N. A. Louie. Mar 64, 61p.
Contract AF29 601 5382, Proj. 5776, Task 577601
RTD TDR63 3102 Unclassified report

Descriptors: (*Equations of state, Measurement), (*Aluminum, Fracture (Mechanics), (*Plastics, Fracture (Mechanics)), (*Fracture (Mechanics), Theory), Epoxy plastics, Shock waves, Velocity, Propagation, Phenolic plastics, Nylon, Time, Stresses, Reentry vehicles, Tensile properties, Materials, Test equipment, Halocarbon plastics, Spallation, Shock (Mechanics), Compressive properties, Impact shock.

Studies of crack-propagation rates in plastics and polycrystalline aluminum were conducted to help test the validity of Waldorf's fracture theory. Results of these studies revealed that the omission of plastic-flow effects in the Waldorf equation is a serious neglect, since this flow can appreciably alter the effective stress at the crack tips under suitable conditions. This phenomenon will modify the temperature dependence of the strength of the material from that given by the theory and its a priori determined parameters. A discussion of fracture-time delay is also included. Dynamic-compression data were experimentally determined for four re-entry vehicle materials: Avcoat II, Chopped Nylon Phenolic, RAD 60, and Series 124A Resin. These data have been used to formulate a Hugoniot equation of state for each material. (Author)

AD-433 242 Div. 14, 4
OTS price $2.60

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
THE PERMEATION OF SALT WATER THROUGH PROTECTIVE COATINGS USING RADIOACTIVE TRACER TECHNIQUES.
Progress rept. no. 7, 15 June-15 Dec 63,
by A. L. Glass. 2 Mar 64, 22p.
Proj. 17
NAEC AML RS7045 17 Unclassified report

Descriptors: (*Protective treatments, Corrosion inhibition), (*Corrosion inhibition, Protective treatments), (*Plastic coatings, Penetration), Sodium compounds, Chlorides, Water, Radioactive isotopes, Electrochemistry, Cellulose acetates, Halocarbon plastics, Polyester plastics, Nylon, Polyethylene

plastics, Acrylic resins, Nitrocellulose, Varnishes, Synthetic rubber, Epoxy plastics.

Data obtained on the permeation of sodium ions, chloride ions and water molecules through eight films using radioactive tracer techniques, are presented. Permeation data on various concentrations of sodium chloride in solution show that perm-selectivity by a membrane for a particular ion may occur. Analysis of graphical presentations of data indicates that the diffusion is Fickian and on further rationalization of these data, the theoretical concepts concerning mechanisms by which ions may diffuse through a membrane are substantiated. (Author)

15. MATHEMATICS

AD-431 210 Div. 15
OTS price $1.25

Behavioral Sciences Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
STUDIES IN RESEARCH METHODOLOGY V IRRELEVANCE IN THE t TEST'S REJECTION REGION,
by James V. Bradley. Dec 63, 41p.
Proj. 7184, Task 718401
AMRL TDR63 109 Unclassified report

Report on Human Performance in Advanced Systems.

Descriptors: (*Statistical tests, Theory), Sampling, Psychology, Effectiveness, Test methods, Statistical analysis.

The most desirable rejection region would consist of those t's having the most extreme sample means in their numerators, since the sample mean is the best and most direct indicator of the value of the population mean, which is the hypothesis under test. Instead, the rejection region consists of the most extreme t ratios, some of which are extreme. Such t's are irrelevant in the sense that rejection is due to the chance value of a variable which has no useful relationship with the hypothesis under test, i.e., no predictive relationship with the population mean. The presence of irrelevant t's in the rejection region can only be detrimental to the power of the test. This report shows that the proportion of irrelevant t's in the t test's rejection region diminishes with increasing sample size and is inversely related to the size, alpha, of the significance level used. Irrelevance virtually disappears at very large sample sizes; however, it is quite appreciable at the sample sizes commonly used in psychological experiments. (Author)

AD-431 256 Div. 15, 8
OTS price $4.60

Burroughs Corp., Philadelphia, Pa.
MAGNETIC LOGICAL TRANSDUCERS.
Final rept. 15 Mar 62-22 Aug 63,
by Oscar B. Stram and William F. Keenan. Feb 64. 47p.
Contract AF33 657 8528, Proj. 7062, Task 706204
AL TDR64 22 Unclassified report

Descriptors: (*Magnetic cores, Computer logic) (*Computer logic, Magnetic cores), Mathematical analysis, Matrix algebra, Gates (Circuits), Tables, Statistical distributions.

The central problem with respect to magnetic logical transducers is to find a means of expressing logical systems in a language more closely related to the physical nature of the magnetic logical transducer (as a threshold element) than the ordinary formulation in Boolean algebra. This report describes an approach to the problem using some of the techniques of lattice theory. A sufficient criterion for 3-monotonicity in six-variable functions is also described in terms of lattice theory, and a theory of voting logic is advanced. Finally, the appendix gives recursive formulas for determining the input weights of magnetic logical transducers which will generate each of two particular complete, maximal chains of realizable functions for any number of variables. (Author)

AD-431 267 Div. 15, 30
OTS price $4.60

Cooley Electronics Lab., U. of Michigan, Ann Arbor.
A TRANSFORM TECHNIQUE FOR MULTIVARIABLE, TIME-VARYING, DISCRETE-TIME, LINEAR SYSTEMS,
by A. W. Naylor. Jan 64, 41p. TR142 and rept. no. 4853 22T
Contract DA36 039sc89227, Proj. 3A99 06 001 01
Unclassified report

Descriptors: (*Control systems, Nonlinear systems), Matrix algebra, Linear systems, Mathematical models, Transformations (Mathematics).

In the last several years the use of matrices to characterize time-varying, discrete-time, linear systems has been growing. Attention heretofore has been centered on single-input, single-output systems. This article shows that the previously developed methods can be applied, after certain changes and re-interpretations, to multivariable systems. (Author)

AD-431 536 Div. 15, 30
OTS price $1.10

Northwestern Technological Inst., Evanston, Ill.
AN ALGORITHM FOR GENERATING PSEUDO-RANDOM PERMUTATIONS,
by Rolando Eisen. Feb 64, 5p. Research memo. 93
Contract Nonr1228 10, Pros. WP00019 05,
NR047 021
Unclassified report

Descriptors: (*Combinatorial analysis, Sampling), Programming (Computers), Numbers, Coding.

An algorithm (suitable for coding on electronic computers) which can be used to generate pseudo-random permutations of any N numbers is presented. An ALGOL code of this algorithm and an example, is also given. The advantages of the algorithm are twofold. First, its simplicity makes it easy to employ either as a sub-routine or in the main body of a computer program. Second, no difficulties are encountered in mixed operations of fixed and floating point variables because all numbers used by the algorithm are integers. (Author)

AD-431 537 Div. 15, 18, 33
OTS price $2.60

Northwestern Technological Inst., Evanston, Ill.
THE DUAL METHOD AND THE METHOD OF BALAS AND IVANESCU FOR THE TRANSPORTATION MODEL,
by A. Charnes and M. Kirby. Dec 63, 21p.
Research memo. 86
Contract Nonr1228 10, Projs. WP00019 05,
EF00355 02
Unclassified report

Descriptors: (*Transportation, Mathematical models), (*Mathematical models, Logistics), Numerical analysis.

AD-431 538 Div. 15, 30
OTS price $2.60

Northwestern Technological Inst., Evanston, Ill.
A LINEAR PROGRAMMING APPLICATION OF A LEFT INVERSE OF A BASIS MATRIX,
by A. Charnes and M. Kirby. Nov 63, 22p.
Research Memo. 91
Contract Nonr1228 10, Projs. WP00019 04,
EF00355 01
Unclassified report

Descriptors: (*Linear programming, Theory), (*Matrix algebra, Scheduling), Mathematical models, Optimization, Equations, Functions.

Linear programming theorems are proved by using left inverse of a basis matrix in place of the ordinary inverse. It is shown that such left

inverse always exists and reduces to the regular inverse in the event that the basis matrix is square. It is also proved that even though the left inverse is not unique it can still be used to give a unique expression for any Pj in terms of the basis. Thus it is possible to solve matrix equations of the form BXj=Pj where B is a basis, without considering whether or not B is square. (Author)

AD-431 750 Div. 15, 9, 4
OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
NUMERICAL ANALYSIS OF STIFF EQUATIONS.
by G. Emanuel. 29 Jan 64, 41p. Rept. no. TDR269 4230 20 3
Contract AF04 695 269
SSD TDR63 380 Unclassified report

Descriptors: (*Equations, Numerical analysis), Nonlinear differential equations, Numerical methods and procedures, Fluid mechanics, Chemical reactions, Gases, Hypersonic flow, Reentry vehicles, Reaction kinetics, Integration, Hypersonic nozzles, Motion, Optimization, Polynomials, Stability.

The interaction between a stiff equation and several common integration procedures is examined. Runge-Kutta is the first procedure considered. A convergence condition is derived that can be used to control the integration step size. Truncation error estimates are also shown to be misleading and of limited usefulness for this procedure. A generalized Adams predictor-corrector procedure is examined in detail with regard to stability. A technique for maximizing the step size is introduced and applied to the generalized Adams procedure. The resulting procedure is appreciably faster than the more conventional one. The analysis also shows that the computation speed of any Adams method decreases as the order of the procedure increases. (Author)

AD-431 812 Div. 15
OTS price $4.60

Kansas U., Lawrence.
ON SPECTRAL REPRESENTATION FOR SELFADJOINT OPERATORS. EXPANSION IN GENERALIZED EIGENELEMENTS,
by Eberhard Gerlach. Feb 64, 41p. Rept. no. TR4
Contract Nonr58313
Unclassified report

Descriptors: (*Algebraic topology, Functional analysis), Conformal mapping, Rings, Operators (Mathematics), Transformations (Mathematics), Integrals.

A supplement to the theory of spectral representation for selfadjoint operators in a separable Hilbert space is presented. If m is a spectral measure for the selfadjoint operator A in a Hilbert space, then the ''classical'' theory of spectral representation sets up an isometric isomorphism mapping onto a suitable space of vector-valued functions on the real line. Various results in the classical theory hold m-almost everywhere, but the exceptional sets and the relations between them were not specified. A precise description of the exceptional sets is given, the consequences of this description will be useful for questions of expansion in generalized eigenelements of A. (Author)

AD-431 813 Div. 15
OTS price $1.10

Kansas U., Lawrence.
ON RESTRICTIONS OF FUNCTIONS IN THE SPACES $P^{\alpha,p}$ AND $B^{\alpha,p}$,
by P. Szeptycki. Feb 64, 10p. Rept. no. TR5
NSF Grant GP439, Contract Nonr583 13
Unclassified report

Descriptors: (*Algebras, Bessel functions), Integral transforms, Integral equations, Functional analysis, Topology, Sequences, Inequalities.

AD-431 814 Div. 15, 22
OTS price $3.60

Stanford U., Calif.
SEQUENTIAL TESTS FOR THE MEAN OF A NORMAL DISTRIBUTION IV (DISCRETE CASE),
by Herman Chernoff. 31 Jan 64, 32p. Technical rept. no. 1
Grant GP220
Unclassified report

Descriptors: (*Distribution (Economics), Statistical functions), Measure theory, Costs, Optimization, Numerical analysis, Integral equations, Operations research, Probability.

The problem of sequentially testing whether the mean of a normal distribution is positive has been approximated by the continous analogue where one must decide whether the mean drift of a Wiener-Levy process is positive or negative. The asymptotic behavior of the solution of the latter problem was studied as t approaches infinity and zero. The original (discrete) problem can be regarded as a variation of the continuous problem where one is permitted to stop observation only at the discrete time points. The results involves relating the original problem to an associated problem and studying the limiting behavior of the solution of the associated problem. This solution corresponds to the solution of a Wiener-Hopf equation. The associated problem is the following: a Wiener-Levy process Zt starting at a point (z,t), t is less than 0 is observed at a cost of one per unit time. If the observation is stopped before t = 0, there is no payoff. If t = 0 is reached, the payoff is the quantity squared if it is less than 0 and 0 if it is more than or equal to 0. Stopping is permitted at times t = -1, -2,... . The conditional risk for the optimal procedure, given Zt=z is studied. Bounds and limiting properties are derived using Spitzer's results on the solution of certain Wiener-Hopf equations. (Author)

AD-431 866 Div. 15, 32, 30
OTS price $2.60

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING, INVARIANT IMBEDDING AND QUASILINEARIZATION. COMPARISONS AND INTERCONNECTIONS,
by R. E. Bellman and R. E. Kalaba. Mar 64, 21p. Memo no. RM4038 PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Algebra, Partial differential equations), (*Optimization, Programming (Computers), Boundary value problems, Computers, Control systems, Numerical analysis, Operations research, Integration, Celestial mechanics, Perturbation theory, Mathematical prediction, Numerical methods and procedures, Calculus of variations, Nonlinear differential equations, Sequences.

A nonlinear two-point boundary value problem arising from a variational context is considered from several points of view. First a direct computational solution via quasilinearization is discussed. This method is quadratically conver-

gent. Then the boundary value problem is converted into an initial value problem using dynamic programming and invariant imbedding. Some aspects of combining the methods in a single calculation are discussed. This gives rise to attractive predictor-corrector integration schemes. In addition, an alternative to the usual Hamilton-Jacobi integration theory for the integration of the Euler equation is given. (Author)

AD-431 889 Div. 15, 25
OTS price $1.60

Electronic Defense Lab., Mountain View, Calif.
APPROXIMATIONS FOR SOME RADIAL MATHIEU FUNCTIONS,
by J. E. Burke. 1 Nov 63, 15p. Rept. no. EDL M630
Contracts DA36 039 AMC00088E and DA36 039AMC03404E
Unclassified report

Descriptors: (*Special functions (Mathematics), Numerical analysis), Electromagnetic waves, Mechanical waves, Scattering, Cylindrical bodies, Taylor's series, Bessel functions.

Approximations are given for radial Mathieu functions of the first kind and second kind and for their derivatives. The results are essentially truncated series involving polynomials and the logarithm o parameters. The approximations are based on a knowledge of the usual expansions associated with the Mathieu functions (i. e., Fourier representations of the periodic functions, Bessel-functions series for the radial functions, etc.), and on the well-known series for the Bessel functions. (Author)

AD-431 890 Div. 15
OTS price $1.10

Northwestern Technological Inst., Evanston, Ill.
QUASI-CONCAVITY, CCK DUALITY AND A GRADIENT INEQUALITY FOR NON-DIFFERENTIABLE FUNCTIONS,
by A. Charnes and K. Kortanek. Feb 64, 10p.
Rept. no. RM92
Contract Nonr122810, Proj. NR047 021
Unclassified report

Descriptors: (*Scheduling, Theory), (*Inequalities, Nonlinear systems), Linear programming, Functions.

AD-431 974 Div. 15
OTS price $1.60

California U., Berkeley.
ON THE REFLECTION OF HARMONIC FUNCTIONS AND OF SOLUTIONS OF THE WAVE EQUATION ACROSS LINEAR DIFFERENTIAL BOUNDARY CONDITIONS,
by Vladimir I. Filippenko. Oct 63, 15p.
Contract Nonr22262
Unclassified report

Descriptors: (*Reflection, Harmonic analysis), Boundary layer, Conformal mapping, Polynomials, Functions, Operators (Mathematics), Linear systems.

AD-431 976 Div. 15
OTS price $1.60

California U., Berkeley.
ON A CHANGE OF VARIABLES WHICH VARIES CONTINUOUSLY IN THE PERTURBATION PARAMETER,
by Allen Kelley, Jr. Sep 63, 16p. TR4
Contract Nonr22288
Unclassified report

Descriptors: (*Differential equations, Perturbation, theory), Inequalities, Fourier analysis, Series, Functions, Sequences, Real variables.

AD-431 979 Div. 15
OTS price $4.60

Adelphi Coll., Garden City, N. Y.
AN ASYMPTOTIC METHOD FOR SOLVING PERTURBED WIENER-HOPF PROBLEMS,
by Herbert C. Kranzer and James Radlow. 1963, 42p.
AGM Rept. no. 111
Contract Nonr3360 01, Proj. NR041 252
Unclassified report

Descriptors: (*Integral transforms, Perturbation theory), Functions, Metal plates, Electrical conductance, Refractive index, Electric fields, Polarization, Integration, Diffraction.

AD-431 997 Div. 15, 25
OTS price $2.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
HITTING AND MARTINGALE CHARACTERIZATIONS OF ONE-DIMENSIONAL DIFFUSIONS,
by Michael A. Arbib. 27 Feb 64, 26p. Technical rept. no. 419
Contracts DA36 039sc78108 and AF33 616 7783,
Task 3 99 25 001 08
Unclassified report

Doctoral thesis.

Descriptors: (*Stochastic processes, Probability), (*Diffusion, Theory), Functions, Polynomials.

AD-432 076 Div. 15, 9
OTS price $1.10

Harvard U., Cambridge, Mass.
ANALYTICITY OF MINIMIZING CURVES,
by Eduardo H. Zarantonello. 1963, 9p.
Contract N5ori07634
Unclassified report

Descriptors: (*Curved profiles, Analysis), Transformations (Mathematics), Complex variables, Analysis of variance, Conformal mapping, Fluid flow.

AD-432 093 Div. 15, 30
OTS price $1.60

RAND Corp., Santa Monica, Calif.
SENSITIVITY ANALYSIS AND INVARIANT IMBEDDING,
by R. Sridhar, R. E. Bellman, and R. E. Kalaba.
Mar 64, 20p. Memo. no. RM4039PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Algebra, Control systems), Topology, Boundary value problems, Nonlinear differential equations, Optimization, Perturbation theory, Nonlinear systems, Errors, Algebraic topology, Numerical methods and procedures, Programming (Computers).

The technique of invariant imbedding is sketched and its application to some problems of current interest in adaptive control theory is described. Once the invariant imbedding equations are solved, possibly numerically, sensitivity analysis is greatly aided. This point of view for sensitivity analysis is a radical departure from the usual perturbation method. (Author)

AD-432 148 Div. 15
OTS price $7.60

Stanford U., Calif.
ESTIMATION OF THE COVARIANCE AND AUTOREGRESSIVE

STRUCTURE OF A STATIONARY TIME SERIES,
by M. Casini Schaerf. 13 Jan 64, 74p. Rept. no. 12
Grant DA ARO D31 124G363
AROD 2025 12 Unclassified report

Descriptors: (*Series, Time), Statistical distributions, Functions, Inequalities, Statistical tests.

The following problem is presented: given a finite length of record from a discrete parameter normal covariance stationary time series with zero mean X(t), t = 0, ± 1, ..., estimate the covariance function and other quantities related to it, like the autoregression coefficients. There are three parts: estimation of the covariance function, estimation of the autoregressive structure, and applications to the sunspot series. (Author)

AD-432 161 Div. 15, 8
OTS price $1.10

Institute of Science and Tech., U. of Michigan, Ann Arbor.
UPPER BOUNDS FOR RESISTANCE AND REACTANCE INTEGRALS OF ANALYTIC FUNCTIONS,
by C. B. Sharpe. Mar 64, 9p. Rept. no. 4563 67T
Contract AF33 616 8365
Unclassified report

Descriptors: (*Functions, Complex variables), (*Networks, Design), Inequalities, Integral transforms, Difference equations, Integrals, Feedback, Real variables, Waveguide slots, Antennas, Broadband.

The class of functions F(s) which are analytic in the right half-plane and which are real for s real is considered. A theorem is derived with places bounds on the integrals of the real and imaginary parts of F(i omega) in terms of the difference between the maximum and the minimum values of these quantities in the interval less than or equal to omega less than infinity. (Author)

AD-432 165 Div. 15
OTS price $1.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
A TABULATION OF CERTAIN PROLATE SPHEROIDAL ANGLE FUNCTIONS AND THEIR ASSOCIATED CHARACTERISTIC VALUES,
by Robert O. Harger and Thomas R. Crimmins. Mar 64, 13p. Rept. no. 4563 65T
Contract AF33 616 8365
Unclassified report

Descriptors: (*Functions, Tables), Side-looking radar, Fourier analysis, Integral transforms, Antennas, Illumination, Numerical analysis, Radar signals, Radar antennas.

The prolate spheroidal angle functions are presented in tabular form of the first kind (of order zero and degree zero) and gives their associated characteristic values. The characteristic value is given for c = 1/2, 8(1/2) to six significantj figures. (Author)

AD-432 186 Div. 15
OTS price $8.60

RAND Corp., Santa Monica, Calif.
EXISTENCE, CHARACTERIZATION, AND CONVERGENCE OF BEST RATIONAL TCHEBYCHEFF APPROXIMATIONS,
by Barry W. Boehm. Mar 64, 99p. Rept. no. R427PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Polynomials, Theory), (*Algebras, Topology), Functions, Numerical analysis, Statistical processes, Computer logic.

Some new results in the theory of rational Tchebycheff approximation are presented, and should be of interest to mathematicians and computer scientists. (Author)

AD-432 293 Div. 15, 16
OTS price $4.60

RAND Corp., Santa Monica, Calif.
INCIDENCE MATRICES AND INTERVAL GRAPHS,
by D. R. Fulkerson and O. A. Gross. Mar 64, 44p. Memo. no. RM3994 PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Genetics, Mathematical analysis), (*Matrix algebra, Combinatorial analysis), Mathematical models, Analytic geometry, Algebraic topology, Mathematical prediction.

According to present genetic theory, the fine structure of genes consists of linearly ordered elements. A mutant gene is obtained by alteration of some connected portion of this structure. By examining data obtained from suitable experiments, it can be determined whether or not the blemished portions of two mutant genes intersect or not, and thus intersection data for a large number of mutants can be represented as an undirected graph. If this graph is an interval graph, then the observed data is consistent with a linear model of the gene. The problem of determining when a graph is an interval graph is a special case of the following problem concerning (0, 1)-matrices: When can the rows of such a matrix be permuted so as to make the 1's in each colum appear consecutively. A complete theory is obtained for this latter problem, culminating in a decomposition theorem which leads to a rapid algorithm for deciding the question, and for constructing the desired permutation when one exists. (Author)

AD-432 296 Div. 15
OTS price $3.60

RAND Corp., Santa Monica, Calif.
A MULTISTAGE STOCHASTIC INVESTMENT PROCESS
by A. J. Truelove. Mar 64, 35p. Memo. no. RM4025PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Probability, Optimization), Game theory, Stochastic processes, Operations research.

This problem is formulated as a dynamic programming problem. For the problem as stated, there are two intimately related functions: the survival function, and the betting function. Approximations to these functions are obtained by setting up an N-stage game, with an arbitrary final pay-off function. The principal result shows that this procedure is valid, i.e., a survival function is obtained for the N-stage game that converges uniformly to the survival function for the 'infinite' game. (Author)

AD-432 373 Div. 15, 25
OTS price $2.60

Northwestern Technological Inst., Evanston, Ill.
THE NATURE OF IRREVERSIBILITY,
by M. B. Lewis. 1964, 21p.
Contract Nonr122825
Unclassified report

Descriptors: (*Irreversible processes, Equations), Quantum mechanics, Probability, Distribution theory, Functional analysis, Statistical mechanics.

A set of reversible equations for F1, the first distribution function and g, the correlation function, are derived for the weak force case. The forward motion, i.e., development in time from uncorrelated initial conditions, and the corresponding reverse motion are examined. In the forward motion the equation for F1 evolves into the Fokker-Planck equation while in the corresponding reverse motion F1 is described by an anti-Fokker-Planck equation. (Author)

AD-432 435 Div. 15, 6
OTS price $1.10

RAND Corp., Santa Monica, Calif.
A SERIES EXPANSION FOR LOG I sub o(z), WITH APPLICATION TO DETECTION THEORY,
by Ivan Selin. Mar 64, 9p. Rept. no. P2055 1
Unclassified report

Descriptors: (*Bessel functions, Series), (*Detectors, High frequency), Sequential analysis, Real variables, Taylor's series, Noise, Electromagnetic pulses, Radar signals.

AD-432 475 Div. 15, 2
OTS price $3.60

Measurement Analysis Corp., Los Angeles, Calif.
PREDICTION OF TIME SERIES USING MULTIPLE REGRESSION TECHNIQUES AND SEAKEEPING APPLICATIONS,
by Loren D. Enochson. Dec 63, 40p. Rept. no. 307 01
Contract Nonr430500
Unclassified report

Descriptors: (*Time, Mathematical prediction), (*Statistical functions, Data), Series, Least squares method, Statistical tests, Programming (Computers), Ocean waves, Vibration, Mechanical waves, Acoustics, Periodic variations, Motion, Statistical analysis, Correlation techniques, Aircraft, Statistical processes.

This report discusses methods for predicting future values of discrete time series from past observed values of the time series. The points at which the autocorrelation function is computed are the past points used in the analysis. Classical ideas are reviewed, and then extended to handle more advanced time series problems. Applications of these results are explained for seakeeping applications of: (1) long range ocean prediction, (2) short term roll prediction, and (3) vibration response prediction. Further material appears on statistical tests for coefficient determination, and on digital computer requirements. (Author)

AD-432 547 Div. 15
OTS price $2.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
DETERMINATION OF SOME PROCEDURES WITH A HIGH ORDER OF EXACTNESS FOR THE NUMERICAL INTEGRATION OF DIFFERENTIAL EQUATIONS,
by A. Cotiu. 4 Dec 63, 23p.
RSIC 104 Unclassified report

Translated from Analele Stiintifice ale Universitatii, ''Al. I. Cuza'' din Iasi, Sectiunea I, 6, pp. 585 - 598, 1960.

Descriptors: (*Differential equations, Integration), (*Numerical methods and procedures, Differential equations), Numerical analysis, Taylor's series, Equations, Transformations (Mathematics).

Procedures of high order of exactness are established for the numerical integration of first-order differential equations requiring a very small number of substitutions in the differential equation. Procedures are described for seventh-order exactness requiring only 2 substitutions in the differential equation, seventh order exactness requiring 3 substitutions in the differential equation, and the eight order of exactness also requiring 3 substitutions in the differential equation. The differential equation is transformed as convenient by 2 generalizations of a transformation which allows the obtaining of procedures of sixth-order exactness requiring 3 substitutions in the differential equation. (Author)

AD-432 698 Div. 15, 25, 2
OTS price $8.60

Innsbruck U. (Austria).
RESEARCH OF NONLINEAR BOUNDARY VALUE PROBLEMS USING THE METHOD OF LIE SERIES DEVISED BY GROBNER.
Final technical rept., 1 Nov 63-31 Jan 64,
by W. Grobner and F. Cap. 31 Jan 64, 98p.
Contract DA91 591EUC2807
Unclassified report

Descriptors: (*Boundary value problems, Numerical methods and procedures), Series, Nonlinear systems, Differential equations, Multiple operation, Statistical analysis, Celestial mechanics, Real variables, Perturbation theory.

The Lie series calculus has led to the discovery of a spectrum of iteration rules for the numerical treatment of differential equations. For the numerical treatment of boundary value problems, formulas for initial value problems are utilized, and with the aid of the Newtonian iteration method, the missing initial values from the prescribed boundary and intermediate conditions are determined. (Author)

AD-432 783 Div. 15
OTS price $6.40

Wisconsin U., Madison.
STATISTICAL ANALYSIS OF EMPIRICAL DISTRIBUTION FUNCTIONS,
by Roger Louis Grossel. 1964, 67p.
Unclassified report

Master's thesis.

Descriptors: (*Statistical functions, Statistical analysis), Probability, Sampling, Mathematical prediction, Analysis of variance, Inequalities, Statistical tests, Pulse analyzers.

A statistical analysis of empirical distribution functions is considered. The sample mean and sample variance are used as estimators for the true mean and variance when the form of probability distribution of a random variable is known; the empirical cumulative distribution function (cdf) is used as an estimator for the true cdf of a random variable under general conditions when no assumptions or knowledge of the form of distribution of the random variable are required. The distance of the estimates from the true values is analyzed by the method of confidence intervals. (Author)

AD-432 804 Div. 15
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
COORDINATE SPACES AND INFINITE SYSTEMS OF LINEAR EQUATIONS. II,
by Y. I. Gribanov. 25 Feb 64, 16p.
RSIC 140 Unclassified report

Trans. from Izvestiya Vysshikh Uchebnykh Zavedenii: Matematika, No. 1 (32), pp. 66-74, 1963.

Descriptors: (*Equations, Linear systems), Operators (Mathematics), Functional analysis, Conformal mapping.

AD-432 991 Div. 15
OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
REVERSAL OF THE LYAPUNOV, HOLDER, AND MINKOWSKI INEQUALITIES AND OTHER EXTENSIONS OF THE KANTOROVICH INEQUALITY,
by Albert W. Marshall and Ingram Olkin. Feb 64, 24p. Rept. no. D1 82 0327, Math. Note no. 335
Unclassified report

Also available from the Author.

Descriptors: (*Inequalities, Matrix algebra), Statistical analysis, Probability, Series, Measure theory, Complex numbers.

Many classical inequalities which involve random variables or functions on a measure space can be reversed if bounds on the random variables or functions are known. This reversal is accomplished by introducing on one side of the inequality an appropriate multiplicative constant which depends on the known bounds. In this paper, several such inequalities are obtained, and a matrix-theoretic interpretation is used to yield various generalizations of Kantorovich's inequality. Some bounds for expectations of convex functions are also given in the multivariate case (Author)

AD-433 074 Div. 15
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
REPORTS OF THE ACADEMY OF SCIENCES USSR (SELECTED ARTICLES).
20 Jan 64, 13p.
FTD TT63 1075 Unclassified report

Trans. from Doklady Akademii Nauk SSSR, 150: 1, pp. 21-22 and 48-51, May 63.

Descriptors: (*Optimization, Theory), (*Linear systems, Partial differential equations), Calculus of variations, Combinatorial analysis, Operators (Mathematics), Algebraic topology, Boundary value problems, Complex variables, Partial differential equations.

AD-433 112 Div. 15, 25, 31
OTS price $3.60

Computation Lab., Harvard U., Cambridge, Mass.
THE TABULATION OF MICHELL'S FUNCTION,
by Garrett Birkhoff and Rohit Parikh. Apr 58, 35p.
Contracts N5ori07634, Nonr186634
Unclassified report

Descriptors: (*Integrals, Programming (Computers)), (*Tables, Integrals), (*Water waves, Numerical analysis), (*Diffusion, Numerical analysis), Hulls, Ships, Heat, Temperature, Time, Taylor's series, Differential equations, Mathematical prediction, Numerical methods and procedures, Fourier analysis, Errors, Special functions (Mathematical).

AD-433 175 Div. 15
OTS price $9.10

RAND Corp., Santa Monica, Calif.
COMPUTATIONAL ASPECTS OF APPROXIMATION THEORY,
by Barry Boehm. Mar 64, 106p. Memo. No. RM4051 PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Numerical analysis, Theory), Probability, Least squares method, Inequalities, Polynomials, Functions, Complex variables, Determinants, Game theory.

The theory of approximation by polynomials and rational functions is of considerable practical significance, due in great part to the efficiency of polynomials and rational functions in representing functions on a high-speed digital computer. Some of the more useful theoretical results are presented along with their interrelations and some of the practical consequences are pointed out. Topics include problems of existence, uniqueness, characterization, and error estimation of best approximations, and algorithms for interpolation and for obtaining best least-squares and Chebyshev approximations. (Author)

AD-433 253 Div. 15, 7
OTS price $2.60

Microwave Research Inst., Polytechnic Inst of Brooklyn, N. Y.
THE MAXIMALLY-FLAT DELAY FUNCTION OF LARGE ORDER,
by S. Deutsch. 27 Jan 64, 30p. Rept. no. 1204 64
Contract AF19 628 3815
Unclassified report

Descriptors: (*Delay lines, Functions), (*Electrical networks, Synthesis), Numerical analysis, Time, Electrical impedance, Delay circuits, Fourier analysis, Integral transforms, Curve fitting, Complex variables.

The maximally-flat time delay (or linear phas) transfer function is examined when the number of poles approaches infinity. The pole diagram is found to be closely approximated by an elliptical array of equi-vertically-spaced poles. The amplitude, time-delay, and transient responses are derived. The elements comprising the output and input ends of a lossless low-pass ladder realization are also derived. Data is given which enables one to find the properties that are associated with any number of poles, large or small, by a graphical interpolation between the known extremes. (Author)

AD-433 279 Div. 15, 30
OTS price $1.60

RAND Corp., Santa Monica, Calif.
THREE NEW COMPUTATIONAL METHODS FOR SOLVING TWO POINT BOUNDARY VALUE PROBLEMS,
by Kenneth B. Bley. Mar 64, 14p. Rept. no. P 2878
Unclassified report

Descriptors: (*Boundary value problems, Numerical analysis), Adaptive control systems, Linear programming, Digital computers, Optimization, Nonlinear differential equations, Series, Calculus of variations.

The methods of Quasilinearization, Dynamic Programming, and Invariant Imbedding are of great practical use in transforming two-point boundary value problems into forms more readily solved numerically. Each of the three methods is discussed through the use of an example. (Author)

AD-433 299 Div. 15
OTS price $1.10

Computation Lab., Harvard U., Cambridge, Mass.
THE LOGARITHMIC PART OF MICHELL'S FUNCTION, by Garrett Birkhoff and Jack Kotik. 1 Feb 53, 4p.
Contract Nonr186634

Unclassified report

Descriptors: (*Special functions (Mathematical), Differential equations), Taylor's series, Series, Linear systems.

16. MEDICAL SCIENCES

AD-431 207 Div. 16
OTS price $1.00

Mayo Clinic, Rochester, Minn.
USE OF THE HUMAN CENTRIFUGE TO STUDY CIRCULATORY, RESPIRATORY AND NEUROLOGIC PHYSIOLOGY IN NORMAL HUMAN BEINGS AND A DESCRIPTION OF AN ELECTRONIC DATA PROCESSING SYSTEM DESIGNED TO FACILITATE THESE STUDIES.
Rept. for 23 Aug 60-1 Nov 61,
by Earl H. Wood, William F. Sutterer, Hiram W. Marshall and A. Clark Nolan. Dec 63, 26p.
Contract AF33 616 7594, Proj. 7222
AMRL TDR63 105 Unclassified report

Report on Biophysics of Flight.

Descriptors: (*Stress (Physiology), Acceleration), Physiology, Data processing system, Cardiovascular system, Blood circulation, Centrifugal fields, Neurology, Respiratory system, Respiration, Tolerances (Physiology), Brain.

Study of the reactions of a system to transient reproducible degrees of stress is a useful means of elucidating the mechanisms of action of the system. Exposures to positive accelerations can be used to produce sudden decreases in arterial pressure at head level of any desired degree down to zero. Study of the reactions of the cardiovascular system induced in this manner to elucidate circulatory physiology has been only partially exploited. These same maneuvers can be used to produce temporary reproducible degrees of stagnant anoxia of the retina and brain of conscious normal human beings and hence offer a potentially fruitful field for study of the interrelationships of the level of consciousness, electrical activity of the brain and retina, arterial pressure at head level and blood flow to these areas. The hydrostatic effects of acceleration cause profound alterations in the ventilation-perfusion ratios in the lungs which are in opposite directions in the dependent and superior portions of the thorax. (Author)

AD-431 208 Div. 16
OTS price $.75

Mayo Clinic, Rochester, Minn.
PHOTOELECTRIC EARPIECE RECORDINGS AND OTHER PHYSIOLOGIC VARIABLES AS OBJECTIVE METHODS OF MEASURING THE INCREASE IN TOLERANCE TO HEADWARD ACCELERATION (+GZ) PRODUCED BY PARTIAL IMMERSION IN WATER,
by Earl H. Wood, Evan F. Lindberg, Charles F. Code and E. J. Baldes. Dec 63, 19p.
Contract AF33 616 7594, Proj. 7222
AMRL TDR63 106 Unclassified report

Descriptors: (*Acceleration tolerance, Physiology), (*Models (Simulations), Acceleration), Underwater, Instrumentation, Centrifuges, Photoelectric materials, Electrocardiography, Posture, Vision, Psychometrics, Cardiovascular system, Analysis of variance, Ear, Blood circulation, Man, Recording systems, Audiometry, Reaction (Psychology).

The protection against the effects of headward acceleration afforded the human by his immersion in water to the level of the xyphoid and to the third rib at the sternum has been assayed in 15 trained centrifuge subjects. Variations in ear opacity, ear opacity pulse, heart rate, respiration and reaction times to auditory and visual stimuli were recorded continuously in a series of 15 subjects during 15-second exposures to acceleration while seated in a steel tub mounted in the cockpit of the Mayo centrifuge. No systematic alterations in the general pattern, characterized by a period of failure during the first 5 to 10 seconds followed by cardiovascular compensation and recovery from visual symptoms during the latter part of the exposure were observed during immersion in water. The decrements in ear opacity associated with the various degrees of visual impairment were closely similar; however, the decrements in ear opacity pulse and increments in heart rate were significantly less during immersion in water than when in air. (Author)

AD-431 209 Div. 16
OTS price $.50

Mayo Clinic, Rochester, Minn.
TECHNICS FOR MEASUREMENT OF INTRAPLEURAL AND PERICARDIAL PRESSURES IN DOGS STUDIED WITHOUT THORACOTOMY AND METHODS FOR THEIR APPLICATION TO STUDY OF INTRATHORACIC PRESSURE RELATIONSHIPS DURING EXPOSURE TO FORWARD ACCELERATION (+GX),
by E. H. Wood, A. C. Nolan, D. E. Donald, A. C. Edmundowicz and H. W. Marshall. Dec 63, 12p.
Contract AF33 657 8899, Proj. 7222
AMRL TDR63 107 Unclassified report

Descriptors: (*Acceleration tolerance, Thorax), Physiology, Blood circulation, Measurement, Pressure, Recording systems, Posture, Heart, Lungs, Oxygen consumption, Respiration, Analysis of variance, Dogs.

Pleural pressures were recorded simultaneously from the ventral and dorsal regions of the thorax using fluid-filled catheters inserted through the chest wall via No. 16 needles using an air-tight technic. Pressures were referenced to the catheter tip levels determined by A-P and lateral roentgenograms, taken prior to and after a series of 1 to 3 minute exposures of 8 anesthetized dogs to accelerations of 2, 4 and 6GX (supine horizontal and 15 degrees head-up and head-down positions). The negativity of intrapleural pressure in the ventral thorax was uniformly increased during exposures while intrapleural pressure in the dorsal thorax became positive. These changes are believed to result from the increase in weight of the lungs and other intrathoracic elements during acceleration and would be compatible with an average specific gravity of the thoracic contents of about 0.5 since the increase in gradient between the dorsal and ventral recording sites averaged about 0.5 cm. H20 per cm. of vertical distance between the sites per G to which the animal was exposed. (Author)

AD-431 211 Div. 16
OTS price $.75

Michigan U., School of Medicine, Ann Arbor.
VESTIBULAR SUPPRESSION,
by Brian F. McCabe. Nov 63, 21p.
Contract AF33 616 7959, Proj. 7231, Task 723103
AMRL TDR63 119 Unclassified report

Descriptors: (*Hearing, Inhibition), (*Acceleration, Hearing), Ear, Physiology, Eye, Motion, Stimulation, Cats, Histology, Biophysics.

Repeated stimulation of the vestibular endorgan of the inner ear produces a response decline which has been termed habituation and which we term vestibular suppression. Machinery was constructed to produce high rotary acceleration in a finely controlled manner to study this phenomenon in cats. Suppression was found to be long lasting and to reach about 60% of original response. It was most rapidly produced at just submaximal levels of stimulus. Postrotatory nystagmus duration was chosen as the response

characteristic for reasons stated, after study of nystagmus parameters. Punishment slowed down the rate of acquisition of suppression in one cat. Intensity function studies, nerve block studies, and increment-decrement intensity function curves not only failed to show presence of functional endorgan damage due to high rates of deceleration but demonstrated the endorgan to be a good deal more rugged than is generally recognized. Transference of effects between the otolith organs and ampullae, using rotation and linear acceleration, was absent. The locus of suppression was shown to be most likely in the pontine reticular formation and not in the nucleus fastigius. The theory of efferent vestibular bundle causation was considered. All lesions were proven histologically. Linear acceleration studies demonstrated an otolithoocular reflex which can produce nystagmic eye movements. (Author)

AD-431 213 Div. 16
OTS price $3.60

Boyce Thompson Inst. for Plant Research, Inc., Yonkers, N. Y.
RESEARCH ON TISSUE CULTURES OF HIGHER PLANTS.
Final rept., 1 July 62-30 June 63,
by Walter Tulecke. Dec 63, 34p.
Contract AF33 657 9298, Proj. 7164, Task 716403
AMRL TDR63 124 Unclassified report

Report on Space Biology.

Descriptors: (*Tissue culture, Algae), (*Algae, Tissue culture), Protein, Photosynthesis, Growth, Carbon dioxide, Nutrition, Space biology.

The nutrient requirements of several plant tissue cultures, their protein content, and their ability to fix carbon dioxide were investigated. These studies were undertaken to compare higher plant tissue cultures with the alga, Chlorella pyrenoidosa (Indiana #26). Several plant tissue cultures could be grown on defined media, but these media were more complex than those required for Chlorella. The protein in the alcohol insoluble residue of Chlorella was 60% and the protein in the same residue from tissue cultures was 10% to 39%. The carbon dioxide fixation of Chlorella exceeded the fixing capacity of the tissue cultures, but some appreciable photosynthetic activity was recorded for tomato tissue. These results are considered preliminary and are not considered indicative of the best autotrophic higher plant tissue cultures which could be obtained. (Author)

AD-431 216 Div. 16
OTS price $.75

Oregon State U., Corvallis.
BIOCHEMICAL AND PHARMACOLOGICAL STUDIES OF 1, 1-DMETHYLHYDRAZINE.
Rep. for 1 June 62-31 May 63,
by D. J. Reed, F. N. Dost, R. S. McCutcheon, R. D. Barbour and C. H. Wang. Dec 63, 20p.
Contract DA18 108cm17154, Proj. 6302, Task 630202
AMRL TDR63 127 Unclassified report

Report on Toxic Hazards of Propellants and Materials.

Descritors: (*Hydrazine derivatives, Alkanes), (*Alkanes, Hydrazine derivatives), Bochemistry, Pharmacology, Rats, Carbon dioxide, Tracer studies, Urine, Respiration.

UDMH at doses of 20, 40 and 60 mg/kg was rapidly metabolized by the rat as evidenced by the metabolism of UDMH-C14 methyl groups to respiratory C1402. C14 was also rapidly excreted into the urine after administration of UDMH-C14 to the rat. At low levels of UDMH intoxication, the bulk of the compound was either metabolized to respiratory C1402 or excreted as either UDMH or metabolite(s) in four to six hours after administration. Total hour period after intraperitoneal administration of 40 mg/kg of UDMH. UDMH intoxication of rats at doses of 20, 40 and 60 mg/kg appeared to preferentially inhibit glucose catabolism to respiratory CO2 via glycolysis and the pentose phosphate pathway. A C-6 decarboxylation process, such as the glucuronate pathway, appeared to be unaffected by UDMH intoxication. (Author)

AD-431 218 Div. 16
OTS price $.50

Oregon State U., Corvallis.
LETHALITY OF PENTABORANE-9 IN MAMMALIAN ANIMALS.
Rept. for 1 June 62-31 May 63,
by F. N. Dost, D. J. Reed and C. H. Wang.
Dec 63, 17p.
Contract DA18 108cm17154, Proj. 6302, Task 630202
AMRL TDR63 128 Unclassified report

Report on Project TORES.

Descriptors: (*Drugs, Toxicity), (*Pentaboranes, Toxicity), Laboratory animals, Mammals, Rats, Lethal dosage, Borohydrides.

A method of transfer and administration of pentaborane-9 to small animals was described. By use of this procedure, median lethal doses of pentaborane-9 by intraperitoneal and inalation administration to the rat were determined to be 3.7 mg/kg and 0.42 mg/kg respectively. An intravenous median lethal dose to the rabbit of 0.52 mg/kg was estimated. The suggestion was made that pentaborane-9 does not oxidize appreciably prior to inhalation, and was almost uanitatively removed from respired air. (Author)

AD-431 281 Div. 16
OTS price $2.60

Texas Univ., Galveston, Medical Branch.
NEWER TRENDS IN BURN RESEARCH WITH RECOMMENDATIONS FOR FUTURE AREAS OF STUDY,
by T. G. Blocker, Jr. and Virginia Blocker.
Sep 63, 26p.
Contracts OCD OS62 129, USPHS86 62 185, OCD Subtask 2421A
Unclassified report

Descriptors: (*Burns, Medical research), Reviews, Shock (Pathology), Immunology, Therapy, Transplantation, Bacteria, Nutrition, Pathology, Blood transfusions, Symposia.

AD-431 285 Div. 16, 28
OTS price $1.10

Hawaii U., Honolulu.
STUDY OF SONIC STIMULI ON FLYING ALBATROSSES.
Semi-annual progress rept., 1 July 63-29 Jan 64,
by Hubert Frings. 29 Jan 64, 7p.
Contract NBy53155
Unclassified report

Descriptors: (*Birds, Behavior), (*Doppler effect, Birds), Sound, Flight paths, Effectiveness, Acoustics, Landing fields, Hazards.

The objective of this study was to determine the effectiveness of acoustic stimuli in deterring

albatrosses from crossing runways and thus creating collision hazards with arriving or departing aircraft. The acoustic stimuli are recordings of helicopter noises alternating with the distress sound of the Black-footed Albatross. Repeating tape cartridges have been provided consisting of a continuous series of 10 secs. of UH noise, followed by 15-20 secs. of Black-foot DC. (Author)

AD-431 299 Div. 16
OTS price $1.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
MECHANISMS OF ACTION OF THE INSECTICIDE ENDRIN,
by Thomas E. Emerson, Jr., Charles M. Brake and Lerner B. Hinshaw. Aug 63, 19p.
CARI 63 16 Unclassified report

Descriptors: (*Insecticides, Toxicity), (*Toxicity, Insecticides), Cardiovascular system, Hypertension, Hematology, Poisoning, Autonomic nervous system, Convulsive disorders, Cerebrospinal fluid, Pressure.

AD-431 301 Div. 16
OTS price $1.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
EXPERIMENTAL EVALUATION OF WORK CAPACITY AS RELATED TO CHRONOLOGICAL AND PHYSIOLOGICAL AGING.
by Bruno Balke. Sep 63, 12p.
CARI 63 18 Unclassified report

Descriptors: (*Aging (Physiology). Physical fitness), (*Physiology, Aging (Physiology)). Exercise, Cardiovascular system, Blood pressure, Hypertension, Oxygen consumption.

Research statistics has established the fact that physical work capacity declines as a consequence of aging. The question has been raised, however, if this decline is the inevitable result of senescence or merely due to changes in living habits. Great numbers of people have been observed not to comply with the statistics. One is inclined to explain such exceptions from the rule on the basis of extraordinary biological characteristics, but the real reason might be a more adequate balance of essential factors in daily life such as work, rest, tension, play, nutrition, physical activity, and others. As maximum performance capacity is only developed and maintained through hard training, the preservation of an acceptable level of work capacity requires frequent exposures to sufficiently high functional demands. Within this concept, two situations under experimental scrutiny are of interest: first, physiological parameters, indicative for physical performance capacity, were intraindividually measured over the years whereby changes of work capacity became apparent as consequence of trainiog, environment, inactivity, disease and retraining. The latter restored the functional adaptability at age 56 nearly to that observed at age 20-30. (Author)

AD-431 302 Div. 16
OTS price $3.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
THE MECHANISMS OF INTRARENAL HEMODYNAMIC CHANGES FOLLOWING ACUTE ARTERIAL OCCLUSION,
by Lerner B. Hinshaw, Barbara B. Page, Charles M. Brake, Thomas E. Emerson, Jr. and Frederick D. Masucci. Oct 63, 31p.
CARI 63 22 Unclassified report

Descriptors: (*Kidneys, Blood circulation), (*Blood circulation, Kidneys), Arteries, Obstruction (Physiology), Stress (Physiology), Sympathomimetic agents, Physiology, Blood pressure.

The hemodynamic response of the kidney to acute arterial occlusion is poorly understood. The purpose of the present study was to determine intrarenal hemodnamic changes in intact and isolated kidneys following arterial occlusion. The relative roles of metabolic, myogenic and tissue pressure influences on the post-occlusion response were evaluated. The response of the kidney to occlusion was found to be complex depending on the interaction of a variety of physical and humoral forces. Increase in renal resistance appeared to be due in part to adrenergic agents and were enhanced by extending time of occlusion and lowering the arterial pressure. The combined effects of pre-venous dilatation and diminished tissue pressure resulted in a decreased resistance following shorter periods of occlusion. Pre-venous dilatation was accounted for by depressed vascular sensitivity to pressor agents and the presence of vasodilator substances. Changes in venous segment resistance were found to be of primary importance in both the autoregulatory phenomenon and the post-occlusion hyperemic response to short (fifteen second) occlusion periods. (Author)

AD-431 548 Div. 16
OTS price $8.10

Naval Radiological Defense Lab., San Francisco, Calif.
REQUIREMENTS FOR MILITARY RADIACS. 2. EFFECT OF THE OPERATOR ON THE ENERGY-DIRECTIONAL RESPONSE OF PORTABLE RADIATION INSTRUMENTS,
by H. R. Wasson and D. H. Williams. 16 Dec 63, 83p.
NRDL TR701 Unclassified report

Descriptors: (*Operators (Personnel), Radiation measurement systems), (*Radiation measurement systems, Operators (Personnel)), Design, Reliability (Electronics), Gamma rays, Dosimeters, Radioactive isotopes, Calibration, X rays, Radiation monitors.

This report presents the results of experiments designed to determine the response of selected military high-range radiacs to extended gamma radiation fields with and without a phantom (simulated operator). The IM-125/PDR-43, IM-153/PD, IM-108A/PD, PDR-63 (USNRDL prototype), and DT-60(XN-2)/PD were tested with point sources of radiation with energies of 70, 120, 180 keV (eff), 667 keV, and 1170, 1330 keV at radiation intensities in the range 1 to 5 r/hr. Assuming that response of these radiacs to extended-field radiation sources can be inferred from their response to multilateral point sources at specific angles of elevation and over 360 deg of arc, it has been found that response to radiation backscattered from the operator compensates for decrease in response due to body (operator's) attenuation to an extent determined by type of radiac, carrying mode, and radiation energy. The presence of the operator has little effect on the response of the IM-125/PDR-43. Extended-field response of the IM-153/PD, IM-108A/PD, PDR-63, and DT-60(XN-2)/PD are all substantially decreased by the presence of the operator in varying degree, dependent on radiac type and radiation energy. Using present calibration methods, the net effect

of the operator is to cause all of the radiacs tested, except the DT-60(XN-2)/PD, to indicate about 0.75 of the true free-field radiation dose rate or dose. (Author)

AD-431 600 Div. 16
OTS price $5.00

Texas U., Medical Branch, Galveston.
BURNS BIBLIOGRAPHY 1952-1962.
Rept. for 25 June 62-24 June 63,
by T. G. Blocker, Jr. and Virginia Blocker.
24 June 63, 330p.
Contracts OCD OS62, 129, USPHS86 62 185
Unclassified report

Descriptors: (*Bibliographies, Burns), (*Burns, Bibliographies), Radiation effects, Hormones, Wounds & injuries, Therapy, Transplantation, Casualties, Antibiotics, Hematology, Physiology, Pathalogy, Cardiovascular system, Toxins & antitoxins, Biochemistry, Metabolism, Nutrition.

AD-431 630 Div. 16
OTS price $15.00

Texas U., Medical Branch, Galveston.
WORKBOOK ON CONVALESCENT BURN SERUM.
Rept. for 25 June 62-24 June 63,
by T. G. Blocker, Jr. and Virginia Blocker.
June 63, 221p.
Contracts OCD OS62 129, USPHS86 62 185,
OCD Subtask 2421A
Unclassified report

Descriptors: (*Burns, Therapy), immunology, Antigens & antibodies, Blood serum, Toxins & antitoxins, Toxicity, Immunity, Skin, Wounds & injuries, Blood transfusions.

Results of the following topics are presented: 1. Experimental Studies with Reference to Antigen-Antibody Phenomena following Severe Extensive Burns; 2. Immunotransfusion in the Treatment of Burns; 3. Treatment of Severe Burns with Homologous Serum of Rats Convalescing from Burns or from Open Wounds; 4. Evaluation of the Toxin Anti-Toxin Effects of Serum from Burned Individuals; 5. Development of Antibodies against Toxic Substances in Burned Skin; 6. Spurious Auto-Immune Reactions in Gel-Diffusion Plates. (Author)

AD-431 631 Div. 16
OTS price $1.25

Mayo Clinic, Rochester, Minn.
DECREASES IN ARTERIAL OXYGEN SATURATION AS AN INDICATOR OF THE STRESS IMPOSED ON THE CARDIORESPIRATORY SYSTEM BY FORWARD ACCELERATION (+Gx).
Rept. for 23 Aug 60-1 Nov 61,
by Earl H. Wood, A. Clark Nolan, Hiram W. Marshall, Lucille Cronin and William F. Sutteren.
Dec 63, 36p.
Contract AF33 616 7594, Proj. 7222
AMRL TDR63 104 Unclassified report

Report on Biophysics of Flight.

Descriptors: (*Stress (Physiology), Acceleration). (*Acceleration, Stress (Physiology)), Oxygen, Respiratory system, Heart, Anteries, Cardiovascular system, Gravity, Lumps.

The cardio-respiratory alterations produced by gravity on a human centrifuge were studied to determine their temporal characteristics. Blood oxygen saturation was recorded by ear oximetry, and by cuvette oximetry in blood withdrawn continuously from the radial artery of 8 subjects during 3-4 minutes at 2.2, 3.7, 5.6 and on two occasions at 6.4 gravity observations were made when air and 99.6% oxygen were breathed by 3 subjects during intermittent positive pressure (air, 33 mm. Hg) breathing. Thoracic roentgenograms were obtained before and 30-60 seconds and 5 minutes after 5.6 and 6.4 gravity. In 5 subjects pressures were recorded in the aorta, radial artery, right atrium, esophagus and rectum (intra-abdominal). When air was breathed, a progressive decrease in arterial oxygen saturation from a mean control value of 97% occurred with increasing levels of acceleration, beginning about 10-20 seconds after and attaining a stable level of 86% by cuvette and 83% by earpiece after 130 seconds at 5.6 gravity. (Author)

AD-431 726 Div. 16
OTS price $1.60

Northrop Space Labs., Hawthorne, Calif.
EVALUATION OF CERTAIN MARINE ALGAL FLAGELLATES FOR MASS CULTURE,
by Richard W. Eppley. Nov 63, 15p.
Contract AF41 609 1608, Task 793001
SAM B TDR63 91 Unclassified report

Descriptors: (*Algae, Growth), Microorganisms, Environmental tests, Pigments, Photosynthesis, Effectiveness.

Environmental requirements are reported for maximum growth of ten strains of marine flagellates of the group Volvocales. Three strains display growth rates above average for green algae: Dunaliella tertiolecta, D. primolecta, and Tetraselmis tetrathele. The algae examined display a spectrum of salinity optima, allowing selection of a strain suitable for mass culture in water of most any available salt content. The temperature optimum for growth is found to vary with the salt concentration of the growth medium for D. tertiolecta. All strains so far examined are unusually tolerant of urea, although not all can use urea as a nitrogen for growth. First attempts to obtain mutants capable of utilizing bright light were unsuccessful but provided data on pigment composition and photosynthetic rates of algal cells adapted to growth in light about 1.5 times as intense as sunlight. (Author)

AD-431 788 Div. 16
OTS price $1.10

Naval Medical Field Research Lab., Camp Lejeune, N. C.
THE EFFECT OF STRENUOUS EXERCISE ON SERUM LIPIDS AND ENZYMES, CAMP LEJEUNE - PARRIS ISLAND STUDIES.
Preliminary rept.,
by George L. Calvy, Lawrence H. Coffin, Jr., Menard M. Gertler and Lee D. Cady. Feb 64, 10p.
Unclassified report

Presented at Conference on Epidemiology, American Heart Association, Chicago Heart Association and National Heart Institute, 1 Feb 64 in Chicago, Ill.

Descriptors: (*Exercise, Physiology), (*Physiology, Exercise), (*Blood serum, Chemical analysis), Enzymes, Biochemistry, Lipids, Nutrition, Diet, Medical research.

AD-431 819 Div. 16
OTS price $3.60

Technological Univ., Delft (Netherlands).
STUDIES ON THE TOXINS OF PSEUDOMONAS COCOVENENANS.
Final technical rept., 1 Jan 63-1 Jan 64, by W. Berends. 1 Jan 64, 36p.
Contract DA91 591EUC2802
Unclassified report

Descriptors: (*Pseudomonas, Toxins & antitoxins), (*Toxins & antitoxins, Pseudomonas), Biochemistry, Biophysics, Food poisoning, Microorganisms, Pharmacology, Chromatographic analysis, Bacteria, Ultraviolet spectroscopy, Antibiotics.

Fatal food poisonings have repeatedly occurred amongst the natives of the densely populated parts of Mid-Java in Indonesia. These were caused by the eating of coconut-products (bongkrek) that had been inoculated with moulds (Rhizopus oryzae). A study of the background of these poisonings was made round about 1930. An extensive investigation brought to light the fact that sometimes a bacterium developed instead of the mould with which the defatted coconut was inoculated and this secreted a very active poison. This bongkrekic bacterium was identified as belonging to the genus Pseudomonas and it got the name Pseudomonas cocovenenans. The toxic compound, bongkrekic acid, was isolated from cultures of this microorganism on moist, defatted copra. This isolation was worked out by using extraction procedures followed by thin layer chromatography or liquid-liquid chromatography on Sephadex. The concentration of bongkrekic-acid at the different phases of isolation was determined by measuring the UV-absorption or the antibiotic activity against Cladosporium cucumerinum. (Author)

AD-431 825 Div. 16
OTS price $2.25

Laboratory for the Study of Sensory Systems, Tucson, Ariz.
STUDY AND DEVELOPMENT OF MUSCLE SUBSTITUTES.
Final rept. 1 Sep 62-31 Aug 63, by Howard A. Baldwin, John V. Wait, Ronald L. Brown and Clarence W. Wieske. Jan 64, 85p.
Contract AF33 657 8875, Proj. 4160, Task 416001
RTD TDR63 4181 Unclassified report

Descriptors: (*Muscles, Mathematical Models), (*Mathematical models, Muscles), Simulation, Hydraulic systems, Mechanics, Contraction, Fluid mechanics, Design.

A two phase membrane forms the basic element of a device whose operation may be described by the same mechanical analog which describes skeletal muscle. The contractive device utilizes low pressure air to lift a weight or to move an eccentric shaft of a rotary force transducer (muscle engine). A mathematical model of the contractive device is developed and methods of control of the unit discussed. The fluid amplifier / sphincter valve device demonstrates an analogy to the sphincter action of muscles. When it is incorporated into an hydraulic system, it has characteristics similar to the electronic vacum tube amplifier. The perliminary quiescent and dynamic characteristics of this device are presented. (Author)

AD-431 850 Div. 16
OTS price $1.10

Communication Research Inst., Miami, Fla.
COMMUNICATION STUDIES ON TURSIOPS TRUNCATUS.
Final annual rept. Mar 62-Feb 64, by John C. Lilly. 1 Feb 64, 4p.
Grant AF AFOSR61 62
AFOSR 64 0176 Unclassified report

Descriptors: (*Cetacea, Brain), (*Brain, Weight), Speech, Language, Behavior, Verbal behavior.

This paper calls attention to the large brain of Tursiops truncatus and comparisons are made of this brain with man's brain. The working hypothesis is proposed that there is a critical absolute brain size below which language, as we know it, is impossible and above which language, as we know it, is possible and even probable. Tursiops has a brain above this critical level soon after birth. Material from two separate research results on human children is cited. One giving the statistical average of the acquisition of the first stages of the basic elements of human speech, the other is the average brain weight at the same age. In each study there were several hundreds of cases. The critical size is shown to be approximately 900 to 1000 grams in the case of the human. Observations by the author on an infant Tursiops show that this animal did not acquire the precise clicking of the adult until its brain reached 1000 grams, measured at autopsy. Such results are suggestive that this species is quite capable of language behavior. The problem then resides in determining whether or not there is a natural language and/or whether Tursiops can acquire an artificial language. (Author)

AD-431 869 Div. 16
OTS price $1.60

RAND Corp., Santa Monica, Calif.
STABLE MODES OF ACTIVITY IN PACEMAKER NEURONS WITH OPEN-LOOP SYNAPTIC INPUT,
by Theodore H. Bullock, George P. Moore, Donald H. Perkel, Joseph H. Schulman and Jose P. Segundo.
Feb 64, 18p. Rept. no. RM3983NIH
Grant GM09608 02
Unclassified report

Descriptors: (*Nerve cells, Electric potential), (*Mathematical models, Nervous system), (*Digital computer, Simulation), Bionics, Mathematical prediction, Stability, Ganglia, Crustacea, Physiology.

The consequences of inhibitory or excitatory interactions between pacemaker neurons were predicted mathematically and through digital-computer simulations, and were then confirmed experimentally in abdominal ganglia of Aplysia californica and in stretch receptors of Procambarus clarkii. Characteristic self-stablizing discharge patterns occur under conditions that do not involve feedback. Increased arrival rates of inhibitory (or excitatory) input can cause a paradoxical increase (or decrease) in firing rate. (Author)

AD-431 924 Div. 16, 28
OTS price $1.10

Civil Aeromedical Research Inst., Oklahoma City, Okla.
RESUME AND INDEX OF REPORTS OF THE CIVIL AEROMEDICAL RESEARCH INSTITUTE, 1961 - 1962,
by Stanley R. Mohler and J. Robert Dille. Feb 63, 9p.
CARI 63 2 Unclassified report

Descriptors: (*Indexes, Aviation medicine), (*Aviation medicine, Indexes), Acceleration, Acceleration tolerance, High altitude, Temperature, Oxygen consumption, Oxygen masks, Medicine.

Division 16 - MEDICAL SCIENCES

AD-431 943 Div. 16
OTS price $6.60

British Columbia Research Council (Canada).
''MOSQUITO REPULSION''.
Annual progress rept.,
by R. H. Wright. 15 Feb 64, 64p.
Contract DA49 193md2391
Unclassified report

Descriptors: (Insect repellents, Culicidae), (*Culicidae, Insect repellents), Flight speeds, Reaction (Psychology), Environmental tests, Vapors, Effectiveness, Infrared spectroscopy, Analysis, Controlled atmospheres, Flight paths.

Experiments, both qualitative and quantitative, with Aedes aegypti, mainly in a specially designed two-air-stream observation chamber, have led to the provisional isolation and identification of a number of unit responses by the mosquitoes to various conditions of their environment. The normal process of host-finding consists f an integrated sequence of essentially mechanical responses. The effect of a repellent vapor in modifying certain of these responses has now been established. This enables the sensory modalities affected by the repellent to be tentatively identified and the possible ways the repellent acts on them to be considered. Repellency is not so much a property as an effect of the chemical, and the total effect may depend on more than one kind of property. In addition to the volatility and far infrared absorption previously considered as important, heat of adsorption and plasticizing properties may also be involved. The implications of these results are considered. (Author)

AD-431 954 Div. 16
OTS price $2.60

Maryland U., College Park.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN, AND CHINESE LITERATURE, VOLUME III, NO. 3,
ed. by George Anastos. 1964, 22p.
Contract DA49 193MD2238
Unclassified report

Descriptors: (*Bibliographies, Medicine), (*Insects, Bibliographies), (*Abstracts, Insects), Ticks, Mites, Diptra, Arachmids, Spirochaeta, Diseases, Fungi, Bacteria, Protozoa, Rickettsia, Viruses.

AD-431 955 Div. 16
OTS price $1.60

Oregon State U., Corvallis.
ACETATE, FORMATE AND RELATED ENZYMES AS FACTORS IN METABOLISM.
Final rept., 1 Nov 61-31 Oct 62,
by Robert W. Newburgh. 31 Oct 62, 17p.
Grant DA CML18 108G44
Unclassified report

Descriptors: (*Metabolism Enzymes), (*Enzymes, Metabolism), Acetate, Formate, Organic compounds, Oxidation, Infants, Insects, Diptera, Carbon dioxide, Purification.

Homogenates of the larvae of Phormia regina oxidize formate to carbon dioxide. The formate oxidizing enzyme was purified about eighteen-fold, and simultaneously a similar purification of catalase was obtained. Formate oxidation is competitively inhibited by nitrite and ethanol and is oxidized by a catalase-peroxide complex. Hydrogen peroxide is generated by oxidation of reduced sulfhydryls like glutathione and homocysteine. It is also produced by the oxidation of hypoxanthine by xanthine oxidase, NADH sub 2 and NADPH sub 2 plus plus through flavins, and possibly folate. Thus formate oxidation in Phormia involves coupled reactions between enzyme systems producing hydrogen peroxide (except glutathione oxidation if it is a non-enzymatic reaction) to form a complex with catalase, which in turn oxidizes formate to carbon dioxide. If Phormia regina is grown on a diet in which carnitine replaces choline, then a new phosphatid, phosphatidyl methylcholine is made. (Author)

AD-431 970 Div. 16
OTS price $4.60

Research and Development Survey Board, Washington, D. C.
STUDIES ON RESUSCITATION.
Annual progress rept., 1 Jan 63-29 Feb 64,
by Peter Safar. 29 Feb 64, 48p.
Contract DA49 193MD2160
Unclassified report

Descriptors: (Artificial respiration, Medical research, (*Medical research, Artificial respiration), Cardiovascular system, Blood transfusions, Respiration, Physiology, Biochemistry, High altitude, Anesthesia, Training, Blood pressure, Hypoxia, Respirators.

AD-431 987 Div. 16
OTS price $1.60

Colorado U. Medical Center, Denver.
LIVER BLOOD FLOW AND METABOLISM IN HEMORRHAGE AND HEMORRHAGIC SHOCK.
Final rept., Sep 52-Sep 62,
by Elmer B. Pratt and Joseph H. Holmes. Oct 63, 14p.
Contract DA49 007MD479
Unclassified report

Descriptors: (*Blood circulation, Liver), (*Shock (Pathology), Hemorrhage), Metabolism, Drugs, Therapy, Bile, Antibiotics.

This report was designed to elucidate factors affecting liver blood flow and metabolism in hemorrhage and hemorrhagic shock and to determine if various types of drug therapy might be effective in improving liver blood flow after hemorrhage. (Author)

AD-432 086 Div. 16, 25
OTS price $10.10

General Electric Co., Cincinnati, Ohio.
INVESTIGATION OF THE NOISE ASPECTS OF CARRIER DECK JET ENGINE OPERATION, AND EFFECTS OF NOISE SUPPRESSION ON AIRCRAFT MISSION PERFORMANCE.
VOLUME I. EFFECTS OF NOISE FROM CARRIER DECK JET ENGINE OPERATION ON HEARING, SPEECH INTERFERENCE, AND SONIC FATIGUE.
Final rept. on phase II,
by R. J. Wells, M. W. Schulz and R. B. Tatge.
31 Jan 64, 129p.
Contract NOw62 0887d
Unclassified report

Descriptors: (*Jet engine noise, Naval aircraft), (*Physiology, Hearing), (*Hearing, Fatigue (Physiology), Suppressors, Acoustics, Speech transmission, Pathology, Effectiveness, Mathematical analysis, Linear systems, Transformations (Mathematics), Stress (Physiology).

Information gathered from a literature search relative to hearing loss vs. noise exposure is reviewed. The results of such studies are applied to the specific problem of determining criteria applicable to the hearing damage risk

problem aboard aircraft carriers. Simple nomograms are derived to quickly evaluate the maximum allowable exposure time to a given sequence of take-offs expressed in terms of octave-band sound level vs. time plots at the observer's ear. These charts are based upon the allowance of a computed TTS2 (temporary threshold shift 2 minutes after exposure to the noise) of 10-13 db at 2000 cps and 20-23 db at 4000 cps. Additional nomograms allow rapid computation of TTS growth and recovery during noisy and quiet periods respectively. (Author)

AD-432 116 Div. 16
OTS price $5.60

Naval Radiological Defense Lab., San Francisco, Calif.
HETEROTOPIC PARTIAL AUTOTRANSPLANTATION OF RAT LIVER: TECHNIQUE AND DEMONSTRATION OF STRUCTURE AND FUNCTION OF THE GRAFT,
by J. W. Grisham, G. F. Leong and B. V. Hole.
15 Jan 64, 52p.
NRDL TR714 Unclassified report

Descriptors: (*Transplantation, Liver), (*Liver, Transplantation), Rats, Physiology, Blood circulation, Tissues (Biology), Histology.

Previous attempts to heterotopically autograft parts of liver were reviewed. This review suggested that both adequate bile drainage and adequate blood flow were necessary for successful autografting of hepatic tissue. A two-stage procedure for subcutaneous autotransplantation of the median lobe of the rat's liver by pedicle transfer was modified from Seneviratne's procedure. The modified technique, which separated the graft from the hepatic blood supply but preserved the bile drainage pathway, resulted in preservation of one-fourth to one-third of the mass of the median lobe with relatively normal structure and function for at least one year. This study demonstrated that hepatocytes in autografts could be maintained with normal relationship to bile ducts in the absence of portal blood, if collateral blood supply and biliary drainage were competent. Potential uses of partial autografts of liver for studying certain aspects of hepatic physiology were indicated. (Author)

AD-432 122 Div. 16
OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE VALUE OF FEEDING FACTORS IN PROPHYLAXIS OF RADIATION DISEASES (SELECTED ARTICLES).
18 Feb 64, 24p.
FTD TT63 1064 Unclassified report

Trans. from AN LATSSR. Institut Eksperimental-noy i Klinicheskoy Meditsiny. Trudy. Znacheniye Faktora Litaniya v Profilaktike Luchevoy Bolezni, Izdatel'stvo Akademii Nauk Latviyskoy SSR, No. 28, pp. 83-86 and 117-128, 1962.

Descriptors: (*Radiation effects, Liver), (*Radiation injuries, Therapy), (*Therapy, Radiation injuries), (*Gastrointestinal system, Vitamin B complex), Gamma rays, Nutrition, Diet, Brain, Proteins, Physiology.

AD-432 164 Div. 16
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
REGIONAL HEMODYNAMICS INDICATORS AT VESTIBULAR LOADS,
by B. O. Nakhapetov. 26 Feb 64, 9p.
FTD TT64 32 Unclassified report

Trans. from Fiziologichniy Zhurnal, 9:3, pp. 325-329, 1963.

Descriptors: (*Blood pressure, Oscillographs), (*Oscillographs, Blood pressure), (*Ear, Stress (Physiology)), Arteries, Skin, Temperature, Physiology.

AD-432 173 Div. 16
OTS price $3.60

Yokohama City U. School of Medicine (Japan).
SEROLOGICAL SURVEY ON THE ANTIBODY LEVEL AGAINST HERPES VIRUS AMONG A POPULATION IN A LIMITED AREA OF TOKYO AND VICINITY.
Final rept., 11 Apr 62-10 Apr 63,
by Kamesaburo Yoshino. 10 Apr 63, 32p.
Contract DA92 557FEC34682
Unclassified report

Descriptors: (*Herpes virus, Antigens & antibodies), (*Antigens & antibodies, Herpes virus), Immune serum, Embryonated egg technique, Complement, Neutralization, Test methods, Sensitivity.

Some children's serums contained comparatively heat-labile complement-fixing antibodies, capable of reacting with herpes V antigen, despite the lack of neutralizing antibodies. A simple method for the serum neutralization with herpes simplex virus was developed utilizing the ability of this virus to form plaques in chick embryo monolayers. A constant virus-varying serum system was adopted. The device was the use of eight small agar cover slips (ACS), prepared by punching out of a solidified thin layer of an agar overlay solution, for inoculation of virus-serum mixtures onto a monlayer dish, so that each serum sample could be titrated on one monolayer dish. Serum samples from 39 normal healthy persons were tested by this method and by complement fixation test, and the serum endopoints obtained by the two tests showed a good parallelism. Serum samples collected in clinical wards from patients suffering from keratitis, stomatitis, hepatitis, dermatitis and meningitis were tested for neutralizing antibodies against herpes virus by the above-stated method. Virus isolation was also attempted. Four children showing the symptom of hepatitis all showed positive results. SK strain of herpes simplex virus was further passaged in eggs and clone-purified by plaque isolation in chick embryo fibroblast cultures. (Author)

AD-432 174 Div. 16
OTS price $2.60

Tokyo Metropolitan Ebara Infectious Disease Hospital (Japan).
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS).
Final rept. no. 2, 1 Oct 62-30 Sep 63,
by Yasuzo Nakamizo. 30 Sep 63, 21p.
Contract DA92 557FEC35580
Unclassified report

Descriptors: (*Bacteria, Immunology), (*Gastrointestinal system, Diseases), Mucus, Infections, Antigens and antibodies, Agglutinins, Salmonella, Shigella, Viruses, Medical research.

It was clarified that the antibody titers of serum and rectal mucus against their own causative agents in bacterial acute gastroenteritis

patients were lower than those in Shigellosis. All of the agglutinin titers against live antigen, Latex antigen, O-antigen and H-antigen of these entero-bacilli were mostly low except few cases. In sera of 27 cases of typhoid fever Latex agglutinin titers were generally higher than routine Widal agglutinin titers against Vi-antigen and somatic antigen of Salmonella typhi. Furthermore, Latex Widal test offers the advantage of yielding exact, readable results within 2 hours, while in routine Widal test the reading can be made only after 24 hours. From these reasons it was confirmed that Latex Widal test is worthy to select for sero-diagnosis of Salmonellosis instead of routine Widal test. Comparative study of Shigella excretion between rectal swab culture and quantitative culture titer of rectal mucus showed that Shigella isolation might fail by using fecal specimens or rectal swab when mucus part is few in feces or rectal cavity. (Author)

AD-432 175 Div. 16
OTS price $2.60

Osaka U. (Japan).
PURIFICATION OF HISTAMINE SENSITIZING FACTOR OF BORDETELLA PERTUSSIS.
Final rept. no. 2, 1 Oct 62-30 Sep 63,
by Yoshio Kuwajima. 30 Sep 63, 29p.
Contract DA92 557FEC35587
Unclassified report

Descriptors: (*Antigens and antibodies, Bacteria), (*Bacteria, Antigens and antibodies), (*Histamine, Biological assay), Purification, Culture media, Immunology, Sensitivity.

Histamine Sensitizing Factor (HSF) of Bordetella pertussis was studied. To improve the cultivation method for HSF preparation, growth conditions of B. pertussis were investigated. Ribonucleotides as well as spermine stimulated the growth in a semi-synthetic medium. A new medium suitable for maintenance and surface bulk culture was devised. Intracellular localization of HSF and lethal toxin were studied. HSF was mainly localized in the cell wall prepared by Mickle disintegration, and toxin was found in protoplasm Ribosomes prepared from sonicate contained considerable amount of HSF and toxin. Properties and biological activities of HSF preparation were investigated. Homogeneous preparation of HSF has not yet been obtained. Protective antigen potency against intracellular challenge with B.pertussis was observed in HSF preparation, but conclusion is reserved for further investigation. (Author)

AD-432 176 Div. 16
OTS price $2.60

Keio U., School of Medicine, Tokyo (Japan).
TREATMENT OF TOXOPLASMOSIS.
Rept. no. 2 (Final) 15 Oct 62-14 Oct 63,
by Hisakichi Matsubayashi. 14 Oct 63, 22p.
Contract DA92 557FEC35637
Unclassified report

Descriptors: (*Toxoplasma, Infections), (*Therapy, Toxoplasma), Parasites, Pharmacology, Morphology (Biology), Electron microscopy, Mice, Survival, Medical research.

Screening tests were carried out for the purpose of obtaining new and effective drugs against toxoplasmosis. Compounds tested were 14 pyrimidine derivatives, 17 triazine derivatives, 9 sulfonamide derivatives, 2 thiourea derivatives, 1 purine derivative, and 1 guanidine derivative. The compounds to be tested were given intraperitoneally for five days successively, starting one day before infection. The daily dosage was 1/15 of the LD50 of each compound, the effects of which were evaluated by the differences in survival between the experimental and the control mice. Of the compounds tested, pyrimethamine has been shown to be the single most effective drug. After administration of pyrimethamine to RH infected mice, no mouse died within 21 days and no toxoplasmas were found in the tissues of the surviving mice, based on subinoculation procedures. Treatment with a sulfone-pyridazine combination revealed distinct therapeutic advantages over treatment with the sulfones alone. Showing even greater synergistic effects were the drugs pyrimethamine and pyridazine. Spiramycine and pyridazine, although individually showing only slight killing effects on Toxoplasma, greatly prolonged the period of survival of the treated mice. In combination however, the two drugs were almost equivalent, therapeutically, to pyrimethamine. (Author)

AD-432 177 Div. 16
OTS price $3.60

Kyoto U. (Japan).
METABOLIC FUNCTION OF DEOXYNUCLEOSIDIC COMPOUNDS.
Final rept. no. 1, 1 May 62-30 Apr 63,
by Osamu Hayaishi. 30 Apr 63, 38p.
Contract DA92 557FEC35976
Unclassified report

Descriptors: (*Nucleosides, Metabolism), (*Enzyme precusors, Synthesis), Neoplasms, Enzymes, Phosphates, Purification, Pseudomones, Biochemistry, Biological assay.

Various rat tissues including tumors were analyzed for acid soluble deoxynucleosidic compounds employing a special technique of microbioassay which permits the differential assay of simple and masked (conjugated) deoxynucleosidic compounds. Amounts of masked deoxynucleosidic compounds were found to be higher in tumor tissues than in normal tissues. Treatment of the tumor by Mitomycin C. a carcinostatic antibiotic, caused a marked increase in the amount of the masked deoxynucleosidic compounds. In order to clarify the enzymatic mechanism(s) of the synthesis of deoxynucleoside triphosphates which is turn are the direct precursers of DNA, deoxynucleoside monophosphokinases were partially purified from calf thymus. An acidic pH, triethylamine was found to be an effective and selective precipitant of phosphomolybdic acid. A routine procedure to separate inorganic orthophosphate from various organic phosphates was proposed, and several examples of the application of this procedure to biochemical analyses were presented. A hexokinase was partially purified from the cells of Pseudomonas fluorescens and its properties such as substrate specificity, optiomal pH Km of various substrates etc., were investigated. (Author)

AD-432 178 Div. 16
OTS price $2.60

Tokyo U. (Japan).
STUDIES OF RESPIRATORY DISEASES DUE TO AIR POLLUTION ON THE TOKYO-YOKOHAMA AREA.
Final rept. no. 1, 1 Aug 62-31 July 63,
by Tatsushi Ishizaki. 31 July 63, 29p.
Contract DA92 557FEC36 323
Unclassified report

Descriptors: (*Atmosphere pollution, Respiratory system), (*Respiratory system, Diseases), Acetylcholine, Sensitivity, Allergy, Thresholds (Physiology).

To investigate air pollution respiratory diseases (especially T-Y asthma) among Japanese, a mass survey in the Niigata area and T-Y area was carried out. Subjects submitted for statistic analysis were 2825 in total. There were increased incidence of respiratory symptons such as chronic coughing, increased sputum production and throat irritation among the subjects who are living in T-Y area. This incidence was highest in the native group of T-Y area and particularly high among smokers and subjects with allergic constitution. There were no increased incidence of air way obstructive diseases in T-Y area but group of subjects who were exposed to heavy air pollution tended to have low vital capacity. These results give the evidence that air pollution is harmful for respiratory tract. There was no definite evidence that respiratory sensitivity to inhaled acetylcholine in subjects in T-Y area was increased, in spite of the fact that asthmatic patients have significantly high sensitivity to acetylcholine. (Author)

AD-432 179 Div. 16
OTS price $2.60

Tohoku U. (Japan).
EXPERIMENTAL STUDIES OF THE EFFECT OF CALCIUM DEFICIENT DIET TO THE ARTERIAL WALL AND OTHER TISSUES WITH SPECIAL REFERENCE TO CEREBROVASCULAR DISEASES.
Final rept. no. 1, 1 June 62-31 May 63, by Eiji Takahashi. 31 May 63, 23p.
Contract DA92 557FEC36053,
Unclassified report

Descriptors: (*Deficiency diseases, Cardiovascular system), (*Calcium, Deficiency diseases), (*Cardiovascular system, Deficiency diseases), Arteries, Membranes (Biology), Diet, Metabolism, Nutrition, Pathology, Biochemistry, Rats, Spectroscopy, Brain.

A long-period experimental study of the effect of calcium deficient diets on the arterial walls of albino rats was conducted as a fundamental experiment of the theory concluded from the epidemiological investigation of vascular lesions affecting central nervous system prevailing in the North-East Japanese main land. One hundred forty Wistar strain albino rats were grouped into ten and fed with control diet, mildly calcium deficient and highly calcium deficient diets. Calcium contents were 300 mg, 150 mg, (later 100 mg) and 50 mg per 100 g diets respectively. The effect on the development of the animals was marked in the highly calcium deficient group as low increase rate of body weight and high mortality in the early stage of the life. However, the animals preliminarly fed with the control diet seemed not markedly influenced with the low calcium diet. This tendency was also noted from the balance study of calcium. Resorption rate of calcium was much greater in earlier stage of growth and at the low calcium diet groups. Histological examination showed that the effect of the different diets was not marked at twelfth month of life. (Author)

AD-432 184 Div. 16
OTS price $2.60

Nara Medical Coll. (Japan).
STUDIES ON THE HEMOGLOBIN-OXYGEN EQUILIBRIUM.
Final quarterly rept. no. 1, 1 Jan 62-31 May 63, by Itiro Tyuma. 31 May 63, 27p.
Contract DA92 557FEC36081
Unclassified report

Descriptors: (*Hemoglobin, Molecular structure), (*Physiology, Hemoglobin), Ultraviolet spectroscopy, Laboratory animals, Electrophoresis, Solubility, Biochemistry.

The relation between the chemical structure and physiological function of hemoglobin was investigated with special reference to the role played by the protein moiety in the oxygen equilibrium function. The oxygenation of hemoglobin accompanies a reversible enormous hyperchromicity in the ultraviolet region and a marked increase in the resistance against alkali denaturation, suggesting a reversible conformation change in the protein moiety during the oxygenation. Heterogeneity of adult rat hemoglobin, which probably consists of six subcomponents, was substantiated by alkali denaturation and salting-out techniques. Fetal-maternal differences in molecular structure of hemoglobin were established in rabbits from the measurement of alkali denaturation rate, reactive SH content, and ultraviolet absorption spectrum, although both the hemoglobins exhibit the same homogeneous pattern on starch-gel electrophoresis. In oxygen equilibrium function, the fetal pigment shows a higher oxygen affinity and less Bohr effect than the maternal one, and these differences are ascribed to the differences in their molecular structure. (Author)

AD-432 204 Div. 16
OTS price $1.60

Kyoto U (Japan).
ON THE GROWTH MECHANISM OF PSITTACOSIS-TRACHOMA VIRUSES IN TISSUE CULTURES.
Rept. no. 2 (Final) 5 Feb 62-4 Feb 63, by Noboru Higashi. 4 Feb 63, 14p.
Contract DA92 557FEC34501
Unclassified report

Descriptors: (*Meningopneumonitis virus, Growth), (*Tissue culture, Viruses), Culture media, Cells (Biology), Enzyma, Trypain, Nucleic acids, Purification, Chemical analysis.

Trachoma virus has been succesfully adapted to HeLa cell. The virus passes through eclipse phase during the multiplication and seems to arise from the matrix material, therefore there is no immediate morphological continuity between the infected particles and the new generation of the virus. There is no evidence that trachoma viruses multiply by vinary fission which had been supposed so far. It was found that the preparations of meningopneumonitis virus (MPV) purified by a combination of differential centrifugation, treatments by nuclesses and trypsin, and sucrose density gradient centrifugation consisted mostly of elementary bodies of the virus. Chemical analysis of the elementary body showed that it contained approximately equal amount of ribo-and deoxyribonucleic acid. (Author)

AD-432 207 Div. 16
OTS price $3.60

Osaka U. Medical School (Japan).
ON THE DEFENCE MECHANISMS AGAINST INFECTION.
Rept. no. 2 (Final) 1 Nov 62-31 Oct 63, by Tsunehisa Amano. 31 Oct 63, 39p.
Contract DA92 557FEC35672
Unclassified report

Descriptors: (*Infections, Bacteria), (*Bacteria, Infections), Leukocytes, Antigens and antibodies, Rabbits, Staphylococcus, Streptococcus, Pathology, Salmonella, Countermeasures, Germicides, Bacillus anthracis.

Further studies have been continued on leucozyme C, Aalpha, Abeta and fraction H (histone) of guinea pig leucocytes in these two years. Leucozyme C was proved to require the cooperation of lysozyme in protoplasting the sensitive bacteria. It was contained in a particulate fraction even when extracted from lyophilized leucocytes. Leucozyme Aalpha was found to attack the protoplast membrane of B. megaterium in a different way from plakin. Leucozyme Abeta stops oxygen uptake and causes cytoplasmic destruction of nonpathogenic staphylococci and it can also lyze the protoplasts of B. megaterium in a similar way to leucozyme Aalpha. The Fr. H can kill smooth and rough strains of pneumococci, streptococci and nonpathogenic staphylococci. Of rabbit macrophages, the neutral extract was active for E. coli and rough pneumococci. The acetic acid extract was active for, in addition to the two bacteria, B. anthracis (virulent), Shigella flexneri, type 2a and avirulent strains of Salmonella choleraesuis. The HC1 extract was active for avirulent strains of Salm. choleraesuis and pathogenic staphylococci. After immunizing rabbits with living avirulent Salm. choleraesuis, the bactericidal activity for virulent Salm. choleraesuis appeared in the HC1 extract. The anti-salmonella activity did not bear the O-antigen specificity. Of rabbit leucocytes and guinea pig macrophages active substances were also studied. (Author)

AD-432 209 Div. 16
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CHANGES IN THE STEREOTYPE OF CONDITIONED RESPIRATORY REFLEXES AND RESPIRATORY RESPONSES TO CO2 UNDER THE INFLUENCE OF CHLORPROMAZINE,
by Yu. N. Ivanov and Ye. I. Semeyko. 2 Mar 64, 13p.
FTD TT64 69 Unclassified report

Trans. from Zhurnal Vysschey Nervnoi Deyatelnosti, 13:4, pp. 680-685, 1963.

Descriptors: (*Respiration, Chlorpromazine), (*Chlorpromazine, Respiration), Nervous system, Nervology, Physiology, Brain, Inhibition, Analysis.

AD-432 217 Div. 16
OTS price $5.60

Keio U. School of Medicine, Tokyo (Japan).
AUTOMATIC RECORDING OF PO2, PCO2, PH, Na AND K IN THE BLOOD AND THE BRAIN.
Rept. no. 1 (Final), 1 July 62-30 June 63,
by Toyozo Aizawa. 30 June 63, 59p.
Contract DA92 557FEC35889
Unclassified report

Descriptors: (*Cerebral cortex, Metabolism), (*Brain, Blood circulation), Recording systems, Test equipment, Electroencephalography, Electrodes, Ions, Biochemistry, Biophysics, Instrumentation.

This report has two sections: first, a detailed description concerning establishment of techniques for automatic recording of PO2, PCO2, pH, Na(+) and K(+), and second, of application of the techniques to studies of cerebral circulation and metabolism in vivo. PO2, PCO2, pH and Na(+) electrodes were constructed to our specifications. The PO2 electrode had a fine platinum cathode, surface of which covered with polyethylene membrane having a suitable thickness. The advantage was that the electrode could be calibrated easily and rapidly with gas at known oxygen tension, and was applicable for measurement of PO2 in absolute unit on the cerebral cortex. The pH electrode of McInnes type, the PCO2 electrode reported by Stow and the Na(+) electrode fabricated from Eisenmans NAS11-18 glass had been tested in vitro with satisfactory results. Application of these electrodes was made in the manner in which their sensitive surfaces were lightly placed on cerebral cortex of cats and their output currents were recorded together with systemic arterial blood pressure, electroencephalogram and electrocardiogram on a graph. The validity of the technique can be confirmed by alternation of these parameters in an expected manner under various conditions of cats, such as high gaseous tension of oxygen and carbon dioxide in the blood due to inhalation of O2-CO2 gas mixture. (Author)

AD-432 230 Div. 16,
OTS price $1.60

Dental Research Facility Naval Training Center, Great Lakes, Ill.
THE LACTOBACILLI AND THE INITIAL CARIOUS LESION,
by I. L. Shklair, M. A. Mazzarella, W. R. Shiller, and H. J. Keene. Dec 63, 12p.
Unclassified report

Descriptors: (*Lactobacillus, Teeth), (*Teeth, Pathology), Dentistry, Military personnel, Distribution, Saliva.

Of the 85 originally caries free subjects, 40 remained caries free and 45 developed one or more carious lesions during a one year observation period. Within the group that remained caries free 30 per cent had lactobacilli counts at the end of this period, whereas, in the carious group 53.3 per cent had consistent numbers of lactobacilli in their saliva. The lactobacilli were evident approximately 5 months prior to the appearance of the initial lesions. The first and second molars were the teeth most frequently involved in the initial lesion. The largest percentage of pit and fissure lesions occurred in the second molars, accounting for almost twice as many as found in the first molars. In the caries active group, those individuals with consistent numbers of lactobacilli in their saliva primarily had pit and fissure cariess, whereas, the very low or negative lactobacilli group had proximal lesions. (Author)

AD-432 337 Div. 16
OTS price $4.60

Linde Co., Div. of Union Carbide Corp., Tonawanda, N. Y.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. XVII. FURTHER STUDIES ON THE MECHANISMS OF FREEZE THAW INJURY OF RED CELLS.
Progress rept.,
by A. P. Rinfret. 19 Feb 64, 43p.
Contract Nonr300300
Unclassified report

Descriptors: (*Erythrocytes, Preservation), Blood cells, Freezing, Biochemistry, Physiology, Enzymes, Temperature, Hemolysis, Nitrogen, Ice, Crystals, Dehydration.

AS an integral part of our efforts to devise and evaluate clinically useful processes for the preservation of blood and red cells at low temperatures, basic biophysical and biochemical aspects of freezing injury to red cells were investigated. Such studies have had as their objective the seeking out of information which might be exploited in formulating practical procedures for preserving blood at liquid nitrogen temperature with maximum recovery of viable cells. This report describes

studies of dehydration as a possible agent of freezing damage, physical and biochemical properties of red cell nucleotide triphosphatase activated by freeze hemolysis, and summarizes results of attempts to employ microadditives in combination with a macroadditive, polyvinylpyrrolidone, to improve red cell recovers, resuspension stabilities and viability. (Author)

AD-432 391 Div. 16
OTS price $2.60

Tokyo Biochemical Research Foundation, Toshima-Ku (Japan).
ENZYMIC ADAPTATION RELATED TO CARBOHYDRATE METABOLISM IN ANIMAL BODY.
Final rept. 15 June 62-14 June 63,
by Norio Shimazono. 14 June 63, 26p.
Contract DA92 557FEC36145
Unclassified report

Descriptors: (*Metabolism, Carbohydrates), (*Carbohydrates, Metabolism), Enzymes, Animals, Diet, Biosynthesis, Lipids, Rats, Liver.

The activities of the enzymes of carbohydrate metabolism are changed in animal body when the animal is fed with a high carbohydrate diet after fasting. This phenomenon could be interpreted as an adaptation mechanism. Especially, the changes in the enzymic activities of the pentose phosphate pathway would affect the production of NADPH which would be related to lipid synthesis from carbohydrate. In the present studies the rats were fed with a high carbohydrate diet after fasting, and the activities of the enzymes related to the pentose phosphate pathway were determined. The rate-limiting step of the pentose phosphate pathway was concluded to be the activity of this enzyme and the ratio of NADP/NADPH. When the enzyme was purified from rat liver, there was no essential difference of the enzyme between fasted rats and refed rats. There was no difference in the kinetic properties and the stability of the enzyme, either. It is not probable that the enzyme activator or inhibitor plays an important role in this adaptation phenomenon, and the most probable cause could be concluded to be the change in the quantity of the enzyme. The supporting evidence was obtained from the fact that this adaptation is lost by the administration of 8-azaquanine to the rats. (Author)

AD-432 416 Div. 16
OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
PRESENCE OF DONOR SPECIFIC GAMMA-GLOBULINS IN SERA OF ALLOGENEIC MOUSE RADIATION CHIMERAS,
by L. A. Herzenberg and L. J. Cole. 2 Feb 64, 13p.
NRDL TR709; NAVMED MR005 08 5200
Unclassified report

Descriptors: (*Gamma globulin, Radiation effects), (*Transplantation, Radiation effects), (*Radiation effects, Transplantation), Mice, X-rays, Bone marrow, Blood serum, Tolerance (Physiology), Physiology.

Young adult DBA/2 mice received a single whole body X-ray exposure of 840 rad (an otherwise lethal dose) followed by an intravenous injection of 8 x 10 to the 6th bone marrow cells from normal (C3H x DBA/2)F1 donors. Control groups included syngeneic (isogenic) chimeras, i.e., DBA/2 mice which received 840 rad plus an injection of 8 x 10 to the 6th DBA/2 marrow cells. Blood serum from these chimeras was collected at times up to 9 months postirradiation, and analysed for total gamma-globulin levels and for specific donor or host type gamma-globulin isoantigens. Marrow-donor type gamma-globulins (Iga1) were found in the serum of the allogeneic chimeras at various times up to 9 months after irradiation. By contrast, the sera from the syngeneic chimeras were negative for Iga1 gamma-globulin, and showed high levels of Iga3 gamma-globulin, the DBA/2 type. It was shown also that the allogeneic chimeras were specifically tolerant to appropriate skin homografts; whereas, the syngeneic chimeras rejected both A-strain skin grafts and (C3H x DBA/2)F1 skin grafts. (Author)

AD-432 484 Div. 16
OTS price $1.10

Civil Aeromedical Research Inst., Oklahoma City, Okla.
THE EFFECTS OF A TRANQUILIZER ON BODY TEMPERATURE,
by E. Arnold Higgins, P. F. Iampietro, Thomas Adams and D. D. Holmes. Oct 63, 7p.
CARI 63 23 Unclassified report

Descriptors: (*Tranquilizers, Body temperature), (*Body temperature, Tranquilizers), Dogs, Temperature, Analysis, Drugs, Temperature control.

Four young adult mongrel dogs were exposed twice untranquilized to each of three environmental temperatures: 4.4 C, 23.9 C and 37.8 C and exposed twice tranquilized with 2.2 mg/kg propiopromazine hydrochloride. Rectal temperatures were monitored and recorded continuously during two hour exposures. Little difference was noted in rectal temperature response for tranquilized and untranquilized animals at 23.9 C exposure. Tranquilized animals showed a greater decline in internal temperature at an environmental temperature of 4.4 C than control and when tranquilized showed a rise in rectal temperature during heat exposure (37.8 C) while control animals showed a decline. These results indicate an impairment in both heat loss and heat conservation mechanisms in the tranquilized animals during thermal stress, but little, if any alteration of temperature control at a nonstressful ambient temperature. (Author)

AD-432 523 Div. 16
OTS price $1.10

Yale U., New Haven, Conn.
COMPARATIVE STUDY OF ECHOLOCATION IN THE TENRECIDAE OF MADAGASCAR AND OTHER WORLD INSECTIVORES.
Final rept.
by Alvin Novick and Edwin Gould. 11 Feb 64, 5p.
Grant AFOSR59 63
AFOSR 64 0245
Unclassified report

Descriptors: (*Rodents, Ecology), (*Insectivora, Ecology), Recording systems, Analysis, Sound, Morphology (biology), Animals, Mammals, Hibernation.

AD-432 802 Div. 16
OTS price $.75

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
EFFECT OF TRANSIENT WEIGHTLESSNESS ON BINOCULAR DEPTH PERCEPTION,
by Edwin H. Sasaki. Dec 63, 7p.
Proj. 7184, Task 718405
AMRL TDR63 134 Unclassified report

Report on Human Performance in Advanced Systems.

Descriptors: (*Weightlessness, Perception), (*Perception, Optical equipment), (*Bionoculars, Perception), Aircraft, Optical equipment components, Analysis, Operation, Effectiveness, Acuity.

To determine the effect of transient weightlessness on binocular depth perception, five subjects were tested under three levels of gravity--0 G, 1 G, and 2 G--produced by flying a JC-131B aircraft through appropriate maneuvers. A modified Howard-Dolman depth perception apparatus was installed in the aircraft. The experimenter set one of three rods forward or backward 1, 2, 3, 4, 5, or 6 cm from the other two rods. Each of the six distance intervals was randomly assigned to one rod position and direction of displacement. The subjects then reported for each trial whether the rods appeared to be equally distant or whether one appeared to be in front or back of the other two. Results indicated that binocular depth perception was not appreciably affected by the three different gravity conditions. (Author)

AD-432 867 Div. 16, 4
OTS price $3.60

Marquette U., Milwaukee, Wis.
(No title).
Interim rept., Dec 63-Feb 64
by Walter Stricks. Feb 64, 37p.
Contract DA49 193MD2146
Unclassified report

Descriptors: (*Serum albumin, Ultraviolet radiation), (*Biochemistry, Serum albumin), (*Radioprotective agents, Ultraviolet radiation), Photochemistry, Organic sulfur compounds, Thiols, Guanidines, Chlorides, Mercury compounds, Amines, Viscosity, Volumetric analysis, Polarographic analysis.

Studies of the catalytic protein waves were extended to protein solutions containing guanidine hydrochloride. The waves of guanidine denatured albumin are much higher while those of irradiation denatured albumin are lower than that of a native albumin solution. The explanation is that the albumin molecule may have different structures if subjected to different methods of denaturation. This is substantiated by viscosity measurements of untreated and guanidine denatured albumin before and after UV irradiation. Fission of disulfide groups under the action of UV light has little effect on the reduced viscosity while fission by means of reducing agents in guanidine denatured albumin results in relatively large changes in viscosity. Interesting results were obtained with irradiated albumin solutions in the presence of various amounts of HgCL2 which acts as a sulfhydryl blocking agent. In the presence of the latter more Hg can be bound by albumin after irradiation. Radiation effects on solutions of mercaptoethylamine, mercaptoethylguanidine and aminoethanethiosulfuric acid were determined. (Author)

AD-432 879 Div. 16, 28, 30
OTS price $8.10

Electronic Systems Div. Air Force Systems Command, Bedford, Mass.
LOGIC OF SYSTEMS INTRODUCTION TO THE FORMAL THEORY OF STRUCTURE.
by Masanao Toda and Emir H. Shuford, Jr. Jan 64, 85p.
Proj. 4690, Task 469003
ESD TDR64 193 Unclassified report

Descriptors: (*Behavior, Theory), (*Theory, Behavior), Physiology, Biology, Physics, Statistical analysis, Physical properties, Computer logic, Atomic structure, Mathematical prediction, Statistical processes.

Structure and purpose are two key aspects in the analysis and synthesis of complex systems. A full-fledged science of behavior must be based on a well-articulated fromal theory of structure and purpose. This first paper introduces some of the basic notions in the formal theory of structure. Later papers will extend the theory of structure, introduce the formal theory of purpose, and investigate the relation between structure and purpose. (Author)

AD-432 880 Div. 16
OTS price $1.10

Naval School of Aviation Medicine, Pensacola, Fla.
THE PROTECTIVE EFFECT OF XYLOCAINE ON THE TOLERANCE OF VIBRATED RATS TO EXPLOSIVE DECOMPRESSION,
by Donald E. Furry. 1 Nov 63, 8p.
Task 17
NAVMED MR005 13 1002 6 Unclassified report

Descriptors: (*Explosive decompression, Tolerances (Physiology)), Rats, Aviation medicine, Vibration, Lungs, Hemorrhage, Pathology.

Tolerance of restrained male rats to explosive decompression from sea level to 40,000 feet was found to be significantly reduced in animals previously exposed to whole body vibration of 25 cps frequency and 0.25 inch displacement for thirty minutes as compared wih the nonvibrated decompressed animals The administration of an intraperitoneal injection of 1.0 ml of a 2% Xylocaine solution effectively increased this tolerance level. The major pathologic findings in the animals utilized in this study were confined to the lungs and consisted of pulmonary hemorrhage, edema, and atelectasis. (Author)

AD-432 890 Div. 16
OTS price $9.10

Biochemical Lab., U. of Virginia, Charlottesville.
ERYTHROCYTE BIOCHEMISTRY,
by Alfred Chanutin. 1964, 108p.
Grant DA MD49 193 63G93
Unclassified report

Descriptors: (*Erythrocytes, Biochemistry), (*Biochemistry, Erythrocytes), Preservation, Lipids, Aging (Physiology), Enzymes, Glutathione, Biosynthesis, Nucleotides, Metabolism, Fatty acids, Phosphates, Glycolysis, Storage, Physiology.

AD-432 904 Div. 16
OTS price $1.10

Bernice P. Bishop Museum, Honolulu, Hawaii.
POTENTIAL VECTORS AND RESERVOIRS OF DISEASE IN NEW GUINEA AND SOUTH ASIA.
Annual progress rept., 1 Apr 63-31 Mar 64,
by J. L. Gressitt. 18 Mar 64, 6p.
Grant DA MD49 193 62G65
Unclassified report

Descriptors: (*Arthropods, Distribution), Collecting methods, Disease vectors, Parasites, Insects.

The main objective of this research was to collect arthropods, particularly those of potential medical importance. Fieldmen concentrated their efforts in the collection and documentation of data of ectoparasites from vertebrate hosts. Approximately 710,050 specimens were collected, including about 175,050 ectoparasites taken from 12,513 vertebrates, partly in conjunction with other projects. Specimens are being processed in Honolulu, Malaya, Japan and Taiwan for distribution to collaborating specialists for their study. Results are in preparation, in press or have been published in Pacific Insects journals and monographs and other established publications. (Author)

AD-432 959 Div. 16, 15
OTS price $21.00

North Carolina State Coll., Raleigh.
THE CULLOWHEE CONFERENCE ON TRAINING IN BIOMATHEMATICS,
ed. by H. L. Lucas. 1962, 397p.
Grant 2G804, Contract AF AFOSR 62 25
AFOSR 4738 Unclassified report

Descriptors: (*Mathematics, Biology), (*Symposia, Training), (*Training, Mathematics), (*Biology, Mathematics), History, Analysis, Test methods, Probability, Communication theory, Computers, Cybernetics, Coding, Statistical data.

AD-432 996 Div. 16
OTS price $1.10

Stanford Research Inst., Menlo Park, Calif.
ATTRACTIVENESS AND REPELLENCY OF MAN TO MOSQUITO BITES.
Annual progress rept., 1 July 63-1 Mar 64,
by W. A. Skinner. 23 Mar 64, 7p.
Contract DA49 193MD2465
Unclassified report

Descriptors: (*Culicidae, Bites and stings), (*Bites and stings, Culicidae), Biochemistry, Chromatographic analysis, Perspiration, Insects.

In cooperation with the Department of Dermatology of the University of California's San Francisco Medical Center, the attractiveness of body odors and sweat of humans to the female Aedes aegypti mosquito were investigated. A simplified olfactometer and a membrane feeding device have been used to evaluate the degree of attractiveness of human sweat, and of extracts of human sweat and body odors. The permeability of water vapor, carbon dioxide, and volatile organic materials for feeding experiments, and of the plastic bags used for collection of sweat and body odors was determined. Lyophilized human sweat from volunteers found to be attractive toward mosquito biting was found to be very attractive to female Aedes aegypti. The attractiveness varied with concentration of the residue left after removal of the water. Sweat from a subject not bitten by Aedes aegypti is being studied. Arm vapors diluted in a stream of air are very attractive to female Aedes aegypti. It has been found that the attractive factor(s) present in arm vapors can be removed by passing the air stream containing it over activated charcoal. Isolation and identification of this factor(s) is in progress. (Author)

AD-433 068 Div. 16
OTS price $1.10

Oxford U. (Gt. Brit.).
A STUDY OF THE PROPERTIES OF SMOOTH MUSCLE.
Final rept., 1 Nov 62-31 Oct 63,
by Edith Bulbring. 15 Jan 64, 10p.
Grant AF EOAR62 5
AFOSR 64 0178 Unclassified report

Descriptors: (*Muscles, Biochemistry), (*Biochemistry, Muscles), (*Biophysics, Muscles), Drugs, Pharmacology, Intestine, Calcium, Membranes (Biology), Physiology, Cells (Biology).

AD-433 072 Div. 16
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MORPHOLOGICAL VARIATIONS IN THE PERIPHERAL LEUKOCYTES DURING GENERAL ROENTGEN IRRADIATION IN CONJUNCTION WITH THE WOUNDING OF A KIDNEY.
by O. L. Tiktinskiy. 14 Jan 64, 6p.
FTD TT63 110 Unclassified report

Trans. from Meditsinskaya Radiologiya, 4; pp. 81-82, 1959.

Descriptors: (*Leukocytes, Radiation effects), (*Radiation effects, Leukocytes), Wounds & injuries, Morphology (Biology), Kidneys, Rabbits, Dogs, Blood cells.

AD-433 077 Div. 16
OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
A SELF-POSITIONING DEVICE FOR THE COLLECTION OF PAROTID FLUID FROM ISOLATED HUMAN SUBJECTS,
by Ira L. Shannon and James M. Terry. Feb 64, 8p.
Task 775602
SAM-B TDR64 8 Unclassified report

Descriptors: (*Tissue extracts, Collecting methods), Blood, Urine, Adrenal glands, Corticosteroid agents, Blood serum, Measurement, Instrumentation, Design.

A conventional metal cap for collecting parotid fluid has been fused to an acrylic biteblock to provide a device that can be quickly positioned and removed by the subject. This not only prevents cap dislodgment during sampling but also makes self-sampling possible in subjects who are exposed to long periods of isolation. (Author)

AD-433 104 Div. 16
OTS price $2.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
AEROMEDICAL REVIEWS. THE EEG IN AEROSPACE MEDICINE. THE ELECTROENCEPHALOGRAM IN AIRCREW AND ASTRONAUT SELECTION,
by Donald R. Bennett and Roger C. Duvoisin.
Dec 63, 23p.
SAM B R12 63 Unclassified report

Descriptors: (*Astronauts, Selection), (*Aviation personnel, Selection), Electroencephalography, Aviation medicine, Reviews, Neurology, Psychiatry.

AD-433 105 Div. 16
OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
SIMULATION WITH CARBON PARTICLES OF BACTERIAL INVASION OF HUMAN GINGIVAL TISSUES,

Division 16 - MEDICAL SCIENCES

by William A. Gibson and Ira L. Shannon.
Feb 64, 8p.
Task 775602
SAM B TDR64 4 Unclassified report

Descriptors: (*Bacteria, Measurement), (*Mouth, Bacteria), Tissues (Biology), Dentistry, Teeth, Carbon, Distribution.

Carbon particles as a suspension of lamp-black powder in physiologic saline were used to simulate the size range and concentration of bacteria as they occur in the gingival sulcus. Gingival strip biopsies were taken from 24 systemically healthy, young adult males with minimal gingival inflammation. For 12 of the subjects, a thorough tooth scaling was performed in the presence of the carbon particles while the remaining 12 subjects, serving as controls, received no dental treatment of any type. In the unscaled group, no carbon particles were found in the underlying connective tissue, indicating that the biopsy procedure and tissue processing did not produce artifacts. Carbon particles were found, however, in the underlying connective tissues of all subjects in the scaled group. The distribution of the carbon particles was identical to the distribution of bacteria reported in previous histologic studies purporting to demonstrate active bacterial invasion of human gingiva. (Author)

AD-433 129 Div. 16
OTS price $2.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
THE EFFECTS OF ALCOHOL AND HYPOXIA ON THE HETEROPHORIAS,
by Richard L. Masters. Feb 64, 24p.
SAMB R2 64 Unclassified report

Descriptors: (*Eye, Alcohols), (*Hypoxia, Eye), (*Alcohols, Eye), Oxygen, Physiology, Medicine, Aviation medicine.

AD-433 136 Div. 16
OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
ENAMEL SURFACE PROTECTION BY TAP-WATER SOLUTIONS OF STANNOUS FLUORIDE,
by Ira L. Shannon and Thomas R. Dirksen. Feb 64, 9p.
Task 775602
SAM B TDR64 7 Unclassified report

In cooperation with Rochester Univ., N. Y.

Descriptors: (*Teeth, Protective treatments), (*Protective treatments, Teeth), Dentistry, Medical research, Fluorides, Effectiveness, Water, Purification, pH.

The ability of stannous fluoride solutions of varying concentration made up in tap water to decrease enamel solubility was tested on 540 extracted human molars. No deleterious effect attributable to aging of test solutions was noted at any time in the 8-week test period. Conversely, protective ability tended to increase with age, this being particularly true during the first few hours after mixing. At these intervals this protective performance was negatively correlated with the pH of the solution. The pH of tap-water solutions was consistently lower than in equally aged preparations made up in distilled water further purified in an ion-exchange column. This lower pH was held to enhance the uptake of tin by enamel and thus to account for the higher protection provided by the tap-water solutions. (Author)

AD-433 153 Div. 16
OTS price $1.60

Warnecke Electron Fibers, Inc., Des Plaines, Ill.
STUDIES ON THE EVOLUTION OF NERVOUS CONTROL.
Annual progress rept. 1 Feb 63-31 Jan 64,
by Harvey J. Karten. 29 Feb 64, 12p.
Contract DA49 193MD2397
Unclassified report

Descriptors: (*Nervous system, Cats), Spinal cord, Cerebellum, Birds, Control, Brain, Cerebral cortex.

The Nauta-Gygax technique for the demonstration of degenerating axons was applied to a study of projections of the parietal association cortex of the cat. Projections of theses areas and interrelations between them are described and the possible significance of such findings are discussed. The organization of the reticular formation of birds and its afferent connections from the spinal cord and cerebellum are reported. A stereotactic atlas of the pigeon brain was prepared. A semiautomatic technique for charting of brain sections was developed. (Author)

AD-433 156 Div. 16, 8
OTS price $8.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIOELECTRONICS IN BIOLOGY (Radioelektronika v Biologii),
by L. B. Kaminir. 21 Jan 64, 81p.
FTD TT63 830 Unclassified report

Trans. from Massovaya Radiobiblioteka, pp. 1-56, 1962.

Descriptors: (*Electronics, Biology), Recording systems, Amplifiers, Scanning, Blood, Analysis, Circuits, Microscopes, Automation.

AD-433 168 Div. 16, 20
OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE GENERATION AND INVESTIGATION OF FIELD DOSES FOR IRRADIATION OF EXPERIMENTAL ANIMALS WITH HIGH-ENERGY PROTONS,
by V. P. Afanas'yev and I. B. Keirim-Markus.
2 Mar 64, 22p.
FTD TT63 1048 Unclassified report

Trans. from Sozdaniye i Tssledovaniye Doznykh Doley Dlya Oblucheniya Eksperimental'nykh Zhivotnykh Protonami Bol'shoy Energii Simpozium Po Biologicheskomy Vozdeystviyu Neytronnykh Oblucheniy (SM-44/57), pp. 1-19, 7-11 Oct 63.

Descriptors: (*Protons, Radiological dosage), (*Medical research, Protons), (*Radiation effects, Proton Beams), Particle Accelerator techniques, Inelastic scattering, Dosimeters, Neutron flux, Dose rate, Tissues (Biology).

AD-433 178 Div. 16
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE ROLE OF ASCORBIC ACID IN RADIATION SICKNESS,
by V. S. Yusinov. 11 Feb 64, 10p.
FTD TT63 1102 Unclassified report

Trans. from Meditsinskaya Radiologiya, 4:9, pp. 79-81, 1959.

Descriptors: (*Radioprotective agents, Ascorbic acid), (*Ascorbic acid, Metabolism), Therapy, Oxidation, Blood, Chemotherapeutic agents, Physiology, Tissues (Biology).

AD-433 189 Div. 16
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ABOUT ANABIOSIS IN THOUSAND YEAR OLD PERMAFROST,
by A. Ye. Kriss and N. A. Grave. 31 Jan 64, 8p.
FTD TT63 926 Unclassified report

Trans. from Mikrobilogiya, 13:5, pp. 251-255, 1944.

Descriptors: (*Permafrost, Life support), Microorganisms, Geology, Preservation, Minerals, Ice, Temperature, Freezing.

AD-433 198 Div. 16
OTS price $9.10

Fordham U., New York.
SELECTED ABSTRACTS FROM SOVIET BIOMEDICAL JOURNALS, NO. 3 (SERIES 2),
by Robert Pollitzer. Nov 63, 108p.
Contract DA18 108 405CML867A
Unclassified report

Descriptors: (*Periodicals, Medicine), (*Abstracts, Medicine), (*Medicine, Abstracts), Parasites, Ticks, Reviews, Pasteurella, Smallpox virus, Diseases, Bacillus anthracis.

AD-433 237 Div. 16
OTS price $5.75

6570th Aerospace Medical Research Labs, Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
AN ANNOTATED BIBLIOGRAPHY ON BIOMEDICAL (ANIMAL) SATELLITE VEHICLES, LIFE SUPPORT SYSTEMS AND RELATED TECHNOLOGY,
by Robert E. Van Patten. Dec 63, 25p.
Proj. 7222
AMRL TDR63 126 Unclassified report

Report on Biophysics of Flight.

Descriptors: (*Life support, Bibliographies), Satellites (Artificial), Spacecraft, Space medicine, Design, Oxygen, Carbon dioxide, Food, Telemeter systems, Wastes (Sanitary engineering), Handling.

This annotated bibliography includes the major fields of interest to designers of biosatellites and covers the period from 1957 to 1963. Documents are listed under the following categories: (1) Animal Capsules, (2) Oxygen, Carbon Dioxide and Toxic Gases, (3) Thermal and Radiation Environments, (4) Food and Feeding, (5) Waste Handling, (6) Biotelemetry, (7) Power Sources, and (8) Weight and Balance Data. (Author)

17. METALLURGY

AD-431 266 Div. 17, 31
OTS price $3.60

Kaiser Aliminum and Chemical Corp., Spokane, Wash.
INVESTIGATION OF THE CORROSION RESISTANCE OF ALUMINUM-STEEL ASSEMBLIES EXPOSED TO SEA WATER -- PART III: EVALUATION OF ONE-YEAR SAMPLES.
Progress rept. no. 21,
by Thomas A. Lowe. 20 Mar 63, 35p. Rept. no. MS PR63 10,
Contract NObs72433, Projs. NS021 200, 04254
Unclassified report

Descriptors: (*Aluminum alloys, Corrosion), (*Steel, Corrosion), Riveted joints, Sea water, Tensile properties, Shear stresses, Protective treatments, Paints, Antifouling coatings, Copper, Electrolytic cells, Rivets, Metal coatings, Aluminum coatings, Zinc coatings, Ship structural components.

The first set of riveted, aluminum-steel assemblies was removed after exposure in tide-range immersion for one year. An evaluation of these assemblies was made on the basis of exterior appearance, the condition of faying surfaces, and a comparison of their breaking strength with unexposed, control samples. The results of this evaluation show that (1) there has been a small loss in the breaking strength of exposed assemblies, (2) the attack of faying surfaces is more a function of the protective paint and joint insulation system than of the rivet material or the aluminum alloy used in the assembly, and (3) significant attack of aluminum exterior surfaces by copper, deposited from the anti-fouling paint used, may cause significant damage of the samples still in test before completion of the program. (Author)

AD-431 311 Div. 17, 27
OTS price $.50

Army Materials Research Agency, Watertown, Mass.
EFFECT OF TEMPERING ON NOTCH PROPERTIES OF D6AC ALLOY STEEL SHEET,
by Robert N. Katz. Dec 63, 15p.
D/A Proj. 1A024401A111
AMRA TR63 35 Unclassified report

Descriptors: (*Steel, Sheets), (*Heat treatment, Mechanical properties), Chromium alloys, Molybdenum alloys, Vanadium alloys, Toughness, Fracture(Mechanics), Temperature, Rocket cases, Chemical analysis, Austenite, Martensite, Tensile properties, Transition temperature, Shear stresses.

A study of the strength and notch properties of D6AC (consumable electrode, vacuum-melted Cr-Mo-V) steel sheet, 0.040 inch thick, was conducted to evaluate the effect of tempering for various test temperatures. Smooth tensile, edge-notched tensile, and precracked subsize Charpy specimens were employed. Tempering in the range of 1000F to 1100F provided good fracture toughness with slight loss in strength properties that would be expected at higher tempers. The results are compared with burst tests conducted on Shillelagh motor cases made from the 0.040-in.-thick D6AC steel. (Author)

AD-431 332 Div. 17, 25
OTS price $4.60

Notre Dame U., Ind.
A PROJECTION DIODE TECHNIQUE FOR THERMIONIC EMISSION FROM SINGLE CRYSTALS OF REFRACTORY METALS.
by F. Gardner, F. Girouard, R. Anthony and E. Coomes. 8 Jan 64, 46p. Scientific rept. no. 1
Contract AF19 604 8434, Proj. 6694, Task 669409
AFCRL 64 234 Unclassified report

Descriptors: (*Refractory materials, Metals), (*Diodes, Thermionic emission), Symmetry (Crystallography), Single crystals, Fluorescent screens, Aluminum, Measurement, Elastic scattering, Molybdenum, Work functions, Temperature, Photometers, Secondary emission, Crystal structure, Tungsten, Image tube, Crystal growth, Microscopy, Microstructure.

An improved electron projection diode with an aluminum-backed fluorescent screen was developed to study thermionic emission from single crystal refractory metal filaments as a function of equilibration. Average thermionic constants phi R and A R may be obtained with the tube operating as a diode; point-by-point thermionic parameters may be obtained by photometric measurements. A modification of the projection diode allows the measurement of the elastically scattered primaries and high energy secondary electrons in a separate tube. Data for recrystallized molybdenum are given. These indicate (a) high work function is always associated with a terraced plateau, which develops on annealing. (b) The deviation of A R from 120 for Mo may be accounted for by patch effect, without recourse to a significant temperature coefficient of work function. (Author)

AD-431 507 Div. 17
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
METALLURGICAL EXAMINATION OF LB-2 COATED TITANIUM BOLT AND SHEET,
by G. Morris. 10 Mar 64, 8p. Rept. no. A466
Contract AF33 657 11215
Unclassified report

Descriptors: (*Bolts, Titanium alloys), (*Sheets, Titanium alloys), (*Titanium alloys, Coatings), Diffusion, Aluminum alloys, Vanadium alloys, Metallography, Photomicrography.

An LB-2 slurry coating was applied to a 6 A1-4V titanium bolt and to a coupon of AMS4901 titanium sheet. The bolt and sheet were then subjected to a standard diffusion cycle. As a result of the diffusion cycle, the sheet became embrittled. Metallurgical examination showed no detrimental effects that resulted directly from the application of the LB-2 coating. The coating appears to be porous and brittle in some areas on the bolt; the LB-2 coating on the titanium sheet showed numerous cracks. Dissolution of the base metal in either the bolt or sheet was not in evidence. (Author)

AD-431 508 Div. 17
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
METALLURGICAL EXAMINATION OF HASTELLOY X FOR CORROSION,
by G. Morris. 10 Mar 64, 5p. Rept. no. A468
Contract AF33 657 11215
Unclassified report

Descriptors: (*Nickel alloys, Corrosion), (*Metallography, Nickel alloys), Chromium alloys, Heat treatment, Cooling, Pickling, Nitric acid, Fluorine compounds, Acids, Photomicrography.

Three pieces of Hastelloy X sheet material were pickled for one hour in a nitric-hydrofluoric solution after being cooled slowly from 2150F in the following manners: (1) Sheet 1 -- Air cooled, (2) Sheet 2 -- Cooled between two steel plates that were preheated to 2150F, and (3) Sheet 3 -- Cooled in a box of heated mica. A metallographic specimen was removed from each of the sheets and examined at 250X. The metallographic specimens were examined and photographed both unetched and after electrolytic etching using a 10% oxalic electrolyte. Intergranular attack was evident in each of the three specimens examined. Mica appeared to produce the most severe intergranular attack. Air cooling appeared to produce the least amount of surface attack of the three cooling methods evaluated. (Author)

AD-431 518 Div. 17, 26
OTS price $7.60

McDonnell Aircraft Corp., St. Louis, Mo.
THE DEVELOPMENT OF ELECTROFORMING TECHNIQUES.
Final rept.,
by Paul Hamilton. 10 Mar 64, 80p. Rept. no. A490
Contract AF33 657 11215
Unclassified report

Descriptors: (*Nickel, electroforming). (*Electroforming, Structural shells). Mandrels, Styrene plastics, Acrylic resins, Isocyanate plastics, Material forming, Waveguides, Pitot tubes.

A test program was initiated to define objectives and further develop electroforming techniques investigated under Test Request 513-277. Mandrel materials selected for evaluation were polystyrene, plexiglass (lucite), cerrotru, polyurethane and renwood. Nickel was electrodeposited from a sulfamate electroplating bath on the prepared mandrels to the desired thickness. Completed electroformed parts were separated from their mandrels utilizing appropriate techniques. Parts successfully electroformed included a wave guide, a bellows and a pitot tube. A sandwich structure attempted was not completed. A study form of renwood was designed and electroformed to evaluate the deposition of nickel on inuside and outside corners as well as in blind holes. The internal stress produced by the nickel sulfamate bath was determined with the aid of the Brenner-Senderoff Contractometer. In view of the initiation of a more extensive electroforming Test Rrquest (TR E9661-060) work on this Test Request was suspended, even though incomplete, and efforts were directed to the more extensive request. (Author)

AD-431 558 Div. 17, 26, 25, 7
OTS price $2.60

TYCO, Inc., Waltham, Mass.
POWER-DENSE THERMOELECTRIC MODULE. PHASE IV. SOLIDIFICATION OF THERMOELECTRIC MATERIALS UNDER THE INFLUENCE OF ULTRASONIC AGITATION.
Progress rept. no. 2, for peroid ending 30 Sep 63,
by Martin Weinstein and A. I Mlavsky. 30 Sep 63, 22p.
Contract NObs86015, Proj. SR0071201
Unclassified report

Descriptors: (*Tellurium alloys, Single crystals). (*Single crystals, Tellurium alloys). (*Manufacturing methods, Single crystals). Ultrasonic radiation, Tin alloys, Lead alloys, Grain structures metallurgy, Compressive properties, Resistance (Electrical), Electrical properties, Mechanical properties, Microstructure, Thermoelectricity, Generators.

The compressive strength of N-type PbTe has been related to the grain diameter, D. Extrapolation of the experimental data to infinite grain diameter yields a fracture strength of 5000 psi for single crystal PbTe. The ultrasonic technique employed for the preparation of N-type PbTe was applied to the solid solution system, PbTe-SnTe (70-30). The average room temperature resistivity of all the prepared ingots fell in the range of 2-4 x 10 to the minus four ohms-cm. The average Seebeck coefficient (in the temperature range of 0-500 = 145 microvolt 1 degrees C). Extensive improvement was obtained in the over-all structure of the P-type ingots. (Author)

AD-431 576 Div. 17
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ON THE OXIDATION MECHANISM OF TITANIUM,
by D. I. Lainer, A. S. Bai and tr. by Ingeborg V. Baker. 14 Feb 64, 10p.
RSIC 135 Unclassified report

Trans. from Fizika Metallov i Metallovedenye, 14:2, 1962.

Descriptors: (*Titanium, Oxidation), (*Oxidation, Titanium), Steam, Air, High-temperature research.

AD-431 588 Div. 17
OTS price $3.60

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
TUNGSTEN FORGING DEVELOPMENT PROGRAM.
Interim technical progress rept. no. 10, 19 Aug 63-19 Jan 64,
by R. W. Redlinger. Jan 64, 37p. Rept. no. ER5750
Contract AF33 600 41629, Proj. 7 797
RTD TR7 797, vol. 10 Unclassified report

Descriptors: (*Tungsten, Material forming), (*Forging, Tungsten), Melting, Electrical arcs, Extrusion, Metallography, Microstructure, Recrystallization, Transition temperature, Brittleness, Ductility, Surface properties, Chemical analysis, Heat treatment.

Forging billets obtained from arc melted and extruded, unalloyed tungsten ingots were used to demonstrate the applicability of a scaled-up forging process for producing thin-wall section components. A six-step forging sequence developed earlier in the program was simplified by eliminating one operation. Process reproducibility was determined from dimensional, metallographic and mechanical property data. As-forged thickness and sidewall concentricity measurements showed the variation in these dimensions to be within 0.030-0.040 in. for the design dimensions. Metallographic examination of as-forged sections revealed wrought microstructures similar to those obtained in earlier forgings. Recrystallization of the wrought structure occurred after 1 hour at 2500F. Determination of ductile-brittle transition temperature from tensile test data showed the transition to be at 375F. (Author)

AD-431 612 Div. 17
OTS price $7.60

Metallurgical Research Labs., Syracuse U., N. Y.
CRACK INITIATION IN METALLIC MATERIALS,
Final rept.,
by K. Schroder, P. Packman, G. Nash and V. Weiss. Jan 64, 78p. Rept. no. MET E1040 0164F
Contract N600 19 59514
Unclassified report

Descriptors: (*Alloys, Fracture (Mechanics)), (*Metals, Fracture (Mechanics)), (*Fracture (Mechanics), Metals), Titanium alloys, Tungsten, Lithium compounds, Fluorides, Recrystallization, Plasticity, Surface properties, Stresses, Brittleness, Deformation, Single crystals, Grain boundaries, Crystal lattice defects, Temperature, Microscopy, Heat treatment, Toughness, Tensile properties.

The effect of surface structure on the fracture strength has been studied on commercially pure tungsten 2.5A1-16V titanium alloy and LiF specimens. Brittle titanium alloy specimens with piggy back notches, tested at room temperature, showed that the decrease in fracture strength due to small grooves in large notches was less than one would expect from an elastic stress analysis. Similar results were obtained from tensile tests on notched tungsten specimens, tested in the as-received and the recrystallized condition at room and liquid nitrogen temperature. Various surface preparation techniques were used. Microplasticity at the surface seems to influence crack initiation. Bend test on notched LiF specimens at room temperature showed that small cleavage cracks at the surface are not necessarily responsible for crack initiation. The following stages of crack initiation were observed: slip bands were formed near the notch, high stress fields were found where these slip bands intersected and the first microcracks were formed in such areas, probably unconnected with the notch surface. (Author)

AD-431 616 Div. 17, 26
OTS price $3.60

McDonnell Aircraft Corp., St. Louis, Mo.
EVALUATION OF BRAZING ALLOYS FOR THE FABRICATION OF INCONEL 718 HONEYCOMB SANDWICH PANELS.
Final rept.
10 Mar 64, 34p. Rept. no. A469
Contract AF33 657 11215
Unclassified report

Descriptors: (*Honeycomb cores, Sandwich construction), (*Sandwich panels, Brazing), Chromium alloys, Nickel alloys, Airplane panels, Silver solders, Metal joints, Corrosion, Gold alloys, Compatibility, Surface properties, Shear stresses, Compressive properties, Failure (Mechanics), Photomicrography.

A nickel base structural alloy, Inconel 718, has been considered for use in the fabrication of honeycomb structures capable of sustained operation at elevated temperatures. Four gold-containing braze alloys were selected for compatibility testing with Inconel 718 base metal. From the results of these tests braze alloys appeared to be suitable for honeycomb structure brazing with Inconel 718 as base metal. No evidence was found to indicate that either of these braze alloys are susceptible to crevice corrosion. Two other braze alloys were eliminated from testing because of inferior wettability and flow characteristics. (Author)

AD-431 617 Div. 17
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
DETERMINATION OF MECHANICAL PROPERTIES AND SURFACE CONDITION OF CHEM-MILLED Cb-5Zr COLUMBIUM ALLOY SAMPLES.
by H. Jacobus. 10 Mar 64, 7p. Rept. no. A473
Contract AF33 657 11215
Unclassified report

Descriptors: (*Niobium alloys, Mechanical properties), (*Mechanical properties, Niobium alloys), Surface properties, Chemical milling, Tensile properties, Zirconium alloys, Experimental data, Metallography.

AD-431 618 Div. 17
OTS price $3.60

McDonnell Aircraft Corp., St. Louis, Mo.
EFFECT OF VARIOUS ANNEALING CYCLES ON INCONEL 718 MICROSTRUCTURE.
Final rept.,
by R. Newcomer. 10 Mar 64, 39p. Rept. no. A470
Contract AF33 657 11215
Unclassified report

Descriptors: (*Heat treatment, Alloys), (*Nickel alloys, Chromium alloys), Aging (Materials), Hardness, Photomicrography, Grain structures (Metallurgy), Metallography, Microstructure, Carbides, Niobium alloys, Titanium alloys.

Metallographic studies were performed to investigate the effect of various annealing cycles on grain size and precipitate morphology in Inconel 718 nickel chromium alloy. Before and after aging, the DPH hardness of all material was determined and photomicrographs at 250X and 2000X were prepared. Annealing temperatures of 1500 and 1600F failed to produce satisfactory results. Annealing between 1700 and 1800F adequately dissolves precipitated phases so that subsequent aging produces maximum hardness. Annealing overaged material at 1900F for 15 minutes appears to completely dissolve precipitate phases without altering precipitation behavior during subsequent aging or encouraging excessive grain growth. When annealed at temperatures greater than 1900F, excessive grain growth can be expected. Precipitation behavior during subsequent aging also appears different with grain boundary films forming. (Author)

AD-431 623 Div. 17
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
EVALUATION OF LB-2 DIFFUSION - COATINGS ON TANTALUM,
by T. C. Grimm. 10 Mar 64, 6p. Rept. no. A476
Contract AF33 657 11215
Unclassified report

Descriptors: (*Tantalum, Protective treatments), (*Coatings, Tantalum), Diffusion, Temperature, Thickness, Oxidation, Sheets, High temperature research.

Tantalum material (0.045 in. thick) can be satisfactorily LB-2 diffusion coated by applying 10-20 mils per side of LB-2 base coat slurry and diffusing per MAC P S 13156, Revision C. The 0.006 in. material should be coated employing smaller slurry coating thicknesses than 7 mils per side (perhaps 2 or 3 mils). (Author)

AD-431 624 Div. 17
OTS price $2.60

McDonnell Aircraft Corp., St. Louis, Mo.
A LIMITED EVALUATION OF ULTRASONIC SPOT WELDS IN X2020-T6 ALUMINUM ALLOY SHEET.
by W. E. Ulery. 10 Mar 64, 26p. Rept. no. A461
Contract AF33 657 11215
Unclassified report

Descriptors: (*Spot welds, Ultrasonic radiation), Resistance welding, Aluminum alloys, Metallography, Shear stresses, Tensile properties, Photomicrography, Hardness, Grain structural (Metallurgy), Failure (Mechanics).

Ultrasonic welding, a newly developed, solid state, non-fusion process for joining sheet metals without solders, fluxes, or filler metals appears to be superior in some respects to electrical resistance welding. A limited evaluation of specimens of X2020-T6 aluminum alloy, indicates that more comprehensive test work should be done in an effort to qualify this process for manufacture of production parts of various structural alloys. (Author)

AD-431 626 Div. 17, 32
OTS price $.75

Lockheed Aircraft Corp., Sunnyvale, Calif.
FUSION WELDING OF ALUMINUM: AN ANNOTATED BIBLIOGRAPHY,
comp. by Helen B. McCormick and Peter R. Stromer.
July 63, 27p. Rept. no. 8 30 63 2, SB63 56
Unclassified report

Descriptors: (*Bibliographies, Welding). (*Welding, Bibliographies). (*Aluminum alloys, Welding). Indexes, Abstracts, Aluminum, Thermal joining, Arc welding.

This bibliography (62 refs.) has been compiled on the fusion welding of aluminum alloys with emphasis on references reporting the latest advances in the Tunsten-Inert-Gas (TIG) process, using either alternating current or direct current straight polarity. Literature coverage is for the period 1962 through June 1963. Entries are arranged alphabetically by senior personal author or by journal article title when no author is given. A subject index is included. The resources of the Lockheed Missiles and Space Co. Technical Information Center were utilized in the compilation of the bibliography. (Author).

AD-431 627 Div. 17, 32
OTS price $2.25

Lockeed Aircraft Corp., Sunnyvale, Calif.
IRON PLATING: AN ANNOTATED BIBLIOGRAPHY,
comp. by Jack B. Goldmann. July 63, 95p.
Rept. no. 3 26 63 5, SB63 55
Contract NOw62 0363
Unclassified report

Descriptors: (*Bibliographies, Plating). (*Plating, Bibliographies). (*Iron, Plating). Iron alloys, Nickel alloys, Electrodeposition, Electroplating, Abstracts, Indexes, Metal coatings.

This annotated bibliography is concerned mainly with the electroplating of iron, and the alloy, iron nickel. Also, production methods for the deposition of heavy layers of iron and iron-nickel on stainless steel were emphasized. No reference is made to the production of thin magnetic films. Printed sources were examined for the years 1940 through June 1963. The arrangement of the bibliography is alphabetical by author. There are three indexes (1) author, (2) corporate source, and (3) patent. (Author)

AD-431 633 Div. 17
OTS price $1.10
McDonnell Aircraft Corp., St. Louis, Mo.
MECHANICAL PROPERTIES OF 6A1-4V TITANIUM WELDMENT.
by James Krieg. 10 Mar 64, 9p. Rept. no. A467
Contract AF33 657 11215
Unclassified report

Descriptors: (*Welds, Mechanical properties), Aluminum alloys, Titanium alloys, Titanium, Welding rods, Tensile properties, Failure (Mechanics), Microstructure.

The object of this investigation is to determine the mechanical properties of the 6A1-4V titanium weldment made with commercially pure titanium filler. Six tensile specimens were prepared from the welded panel and submitted for mechanical property determination. The specimens were tested at room temperature in a 150,000 pound Tatnall Universal Testing Machine. Tensile yield stress, ultimate tensile stress, and elongation in a 2-inch gage length were recorded. In addition, a metallurgical section was removed from one of the failed specimens and a microhardness survey was conducted across the weldment. (Author)

AD-431 651 Div. 17, 26
OTS price $2.60

Arde-Portland, Inc., Paramus, N. J.
DEVELOPMENT OF HIGH-STRENGTH ALLOYS BY CRYOGENIC STRETCH-FORMING.
Quarterly technical rept. no. 3, 10 Oct 63-9 Jan 64,
by Martin S. Miller. 9 Jan 64, 8p.
Contract NOw63 0387c
Unclassified report

Descriptors: (*Stretch forming, Cryogenics), (*Stainless steel, Stretch forming), Niobium alloys, Aluminum alloys, Tensile properties, Deformation, Stresses, Mechanical properties, Strain (Mechanics), Chemical analysis, Austenite.

Twelve heats were procured and tested under the program. Four additional cobalt-molybdenum-modified heats are under test, and another six sets are being machined to tensile coupons. High-age-response Heat RV 1252 presented no problems in welding. However, notch tests (NASA notch) on this material revealed a high notch sensitivity at room temperature. The poor notch response caused rejection of this composition for use in vessel fabrication. A second columbium-aluminum heat, RV 1336, showed improved notch strength (due mainly to a lower carbon content). Room-temperature notch strength ratios below one precluded this material from immediate acceptance. Additional heats tested strengthen the conclusion, advanced in a previous report, that unmodified vacuum-melted 301 stainless steel has negligible strength increase after an aging treatment. Specific alloys must be added to develop an aging system in the steel. The columbium-aluminum system does this effectively, but it renders the material notch-sensitive. Several air-melted heats tested confirmed the reliability of the computer analysis in predicting tensile strength. Deviations between predicted and measured room-temperature tensile strengths ranged from 2 to 10 ksi. (Author)

AD-431 672 Div. 17, 26
OTS price $2.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
WELDING OF REFRACTORY METALS.
Interim quarterly progress rept. no. 5, 1 Oct-31 Dec 63,
by D. J. Seman and F. D. Seaman. Feb 64, 24p.
Contract NOw63 0043c
Unclassified report

Descriptors: (*Refractory metals & alloys, Welding). (*Arc welding, Refractory & metals alloys). Molybdenum alloys, Niobium alloys, Tantalum alloys, Tungsten, Tungsten alloys, Controlled atmospheres, Argon, Chemical analysis, Welds, Transition temperature, Brittleness, Ductility, Aerospace craft, Structural parts, Zirconium alloys, Vanadium alloys.

Effort was directed toward an establishment of weld parameters for the inert gas non-consumable electrode welding and the evaluation of the effect of restraint using various combinations of parameters. This basic information was used to establish general procedures for autogeneous butt welds (0.035in thick), for multipass butt welds (0.125in. thick) and for manual fillet welds (emphasizing full penetration and contact of the low side contour in the down hand vertical overhead position). Qualifying the above procedures in the inFab environment using bend ductility, penetrant inspection radiography and tensile tests as criteria was initiated. Four structural alloys of refractory metals were investigated. These are: TZM, B-66, 90Ta-10W and W. (Author)

AD-431 680 Div. 17
OTS price $2.60

New York U., N. Y.
DEVELOPMENT OF TOUGH, HIGH STRENGTH ALPHA-BETA TITANIUM-BASE ALLOYS AT 240,000-260,000 psi YIELD STRENGTH LEVEL.
Quarterly progress rept. no. 5, 26 Jun-25 Sep 63, by P. A. Farrar and H. Margolin. 25 Sep 63, 21p.
Contract DA30 069ORD3690
WAL TR401 303 4 Unclassified report

Descriptors: (*Titanium alloys, Mechanical properties), Tensile properties, Ductility, Aluminum alloys, Vanadium alloys, Tin alloys, Copper alloys, Iron alloys, Zirconium alloys, Chromium alloys, Molybdenum alloys, Performance (Engineering).

This program was initiated in order to develop useable titanium alloys with 0.1% yield strength in the range 240,000-260,000 psi as well as alloys with higher ductility in the range of 190,000-240,000 psi yield strength. A total of 15 compositions at two interstitial levels were melted as 8-lb ingots and forged to 1/2-in. bar stock. These alloys have been tested and four 80-lb heats have been melted for further evaluation as bar, plate and sheet. The compositions chosen for further evaluation were those which would give the desired ductility for the strength levels in the range from 190,000 to 240,000 psi 0.1% yield strength. (Author)

AD-431 759 Div. 17
OTS price $6.60

Massachusetts Inst. of Tech., Cambridge.
EFFECT OF PROCESSING HISTORY ON FRACTURE OF MATERIALS AT HIGH STRENGTH LEVELS.
Rept. for 1 May 62-1 May 63,
by D. R. Poirier, M. L. Ebner, M. C. Flemings and W. A. Backofen. Sep 63, 61p.
Contract AF33 657 9169, Proj. 7351, Task 735103
ASD TDR63 819, pt. 1 Unclassified report

Report on Metallic Materials.

Descriptors: (*Steel, Manufacturing methods), (*Performance (Engineering), Steel), Sheets, Castings, Porosity, Shear stresses, Toughness, Hardness, Microstructure, Metallography, Electron beams, Fracture (Mechanics), Radiography, Austenite, Martensite.

The influence of melting and solidification variables on the fracture toughness of AISI 4340 steel at a yield strength of 240,000 psi was studied. In this initial part of the program, four different ingot structures were obtained by casting air-melted 4340 steel into four different types of molds: (1) a sand mold, (2) a cast iron chill mold, (3) a 'hot' mold lined with exothermic material, and (4) a mold producing unidirectional solidification. Ingots of these structures were evaluated as described below, as were comparable vacuum cast ingot of types (1) and (4). All material tested (air-melted and cast) had a fracture toughness typical of air-melted AISI 4340 steel but inferior to the best quality vacuum melted steel of this type. It is concluded that vacuum melting and casting per se under some conditions greatly improve the fracture toughness of the steel produced. (Author)

AD-431 775 Div. 17, 26
OTS price $1.10

IIT Research Inst., Chicago, Ill.
FIBER-REINFORCED METALS AND ALLOYS.
Bimonthly rept., 8 Nov 63-8 Jan 64.
7 Feb 64, 5p. Rept. no. B6020 1
Contract NOw64 0066c
Unclassified report

Descriptors: (*Composite materials, Metallic textiles), (*Reinforcing materials, Composite materials), (*Metallic textiles, Composite materials), Metals, Alloys, Ceramic fibers, Aluminum alloys, Magnesium alloys, Tungsten compounds, Carbides, Crystal growth, Powder alloys, Cobalt, Single crystals, Manufacturing methods.

The object of the program is to develop high strength-to-weight ratio metals and alloys through utilization of new or established fiber metallurgy techniques. The experimental approach was threefold involving (1) development of high strength, lightweight matrix materials; (2) production of high strength, high elastic modulus fiber particles; and (3) a fundamental study of the behavior of certain variable-strength fibers in a dissimilar matrix. Investigation of an Al-10% mg demonstrated that the atomized powder could not be consolidated by hot extrusion; neither could powder made from a Al-10Mg-0.1TiB2 melt. Work under category (2) was confined to attempts to calibrate equipment and make fibrous crystals of wc by growth in a liquid phase. Some acceptable crystals were made, and the results were encouraging. For the third phase of the program the composite matrix selected was Ag and the fibers were cut from 0.003 in. diameter, 0.80% C wire. The initial variables in the study will be fiber content and heat treatment. (Author)

AD-431 932 Div. 17, 14, 25
OTS price $4.60

Don Bosco Inst. for Research, Ramsey, N. J.
THE VIBRATION OF A SANDWICH PLATE WITH INTERNAL DAMPING, RADIATING INTO A FLUID MEDIUM ON ONE SIDE,
by Irving W. Jones and V. L. Salerno. Jan 64, 49p. Rept. no. 103
Contract Nonr4199 00
Unclassified report

Descriptors: (*Sandwich construction, Metal plates), (*Vibration, Analysis), Structures, Rubber, Materials, Damping, Fluids, Stresses, Deformation, Fatigue (Mechanics), Fourier analysis, Series, Honeycomb cores.

A theory is developed for the vibration analysis of an infinitely long sandwich plate whose facings and core both have linear damping properties. The plate is simply supported along its two edges. Solutions are obtained for the plate vibrating in vacuo and also for the plate radiating waves into a fluid medium which exists on one side. Expressions are derived for the natural frequencies and the steady state response for both cases.To facilitate use of the theory for

practical problems, a calculation procedure is given. Numerical results are presented for both a lightly damped and a highly damped plate. The former is a conventional honeycomb sandwich plate, the latter a sandwich plate with the same dimensions and facings but with a rubberized, dissipative core. Replacement of the honeycomb core with the dissipative core of equal weight reduces the midspan deflection (and stress) at resonance by about two orders of magnitude. (Author)

AD-431 969 Div. 17
OTS price $1.10

Metals Processing Lab., Mass. Inst. of Tech., Cambridge.
DEFORMATION PROCESSING OF ANISOTROPIC METALS.
Progress rept. no. 3, 1 Nov-31 Dec 63,
by D. H. Avery and W. A. Backofen. Feb 64, 3p.
Contract Now63 0564d
Unclassified report

Descriptors: (*Metals, Anisotrophy), (*Titanium alloys, Deformation), (*Steel, Deformation), Plasticity, Grain structure (Metallurgy), Stresses, Strain (Mechanics), Aluminum alloys, Tin alloys, Temperature, Crystal growth.

The experimental investigation of plastic anisotropy in titanium alloys was continued. Work was also done on the development of plastic anisotropy by control of growth textures in cast material and by introduction of mechanically aligned discontinuities in an otherwise uniform matrix. The study of the 5 Al:2.5 Sn alloy was extended to higher temperatures. Flow stress and strain-rate sensitivity were determined. A high degree of plastic anisotropy was produced in a sheet of 4340 steel by drilling fine holes (0.0625-in. diameter) in a close-packed array (0.071-in. between centers) through the thickness and then filling the holes with soft solder. (Author)

AD-431 971 Div. 17, 25, 26
OTS price $15.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
USE OF X-RAYS IN THE INVESTIGATION OF MATERIALS (Primeneniye Rentgenovykh Luchey K Issledovaniyu Materialov).
16 Jan 64, 236p.
FTD TT63 671 Unclassified report

Trans. from Izdatel'stvo Leningradskogo Universiteta, pp. 3-127, 1959.

Descriptors: (*Steel, Structural properties), (*X-ray diffraction analysis, Reports), (*Reports, X-ray diffraction analysis), Fatigue (Mechanics), Aluminum, Single crystals, Copper, Silicon alloys, Friction, Stresses, Vacuum furnaces, X-rays, Hardness, Wear resistance, Liquefied gases, Nitrogen, Deformation, Cryogenics.

Contents: Fatigue Mechanism of Annealed and Preworkhardened Steel; Fatigue Mechanism of Single Crystals of Aluminum at Normal and Low Temperatures; Fatigue Mechanism of Single Crystals of Metals at Normal and Low Temperatures; Distortions of the Crystalline Structure of Steel 45, Aluminum, and Red Copper Subjected to Fatigue Testing; Effects of the Second and Third Kind During Fatigue of Silicon Steel; Surface Layers of a Metal During Rolling Friction; Structural Distortions of Steel 45 During Rolling Friction; Residual Stresses of the First and Third Kind During Wear of Steel Specimens in the Process of Friction; Wear of Metals with a Prehardened Surface; Shot-peening of Steel by the X-ray method; Distortions of the Crystalline Structure in the Surface Layers of Metals Subjected to Power Cutting; and An Electric Vacuum Furnace with a Device for Loading the Specimens Without Disturbing the Vacuum.

AD-432 123 Div. 17
OTS price $1.10

Defense Metals Information Center, Columbus, Ohio.
REVIEW OF RECENT DEVELOPMENTS. NICKEL-BASE AND COBALT-BASE ALLOYS,
by D. A. Roberts. 21 Feb 64, 2p.
Unclassified report

Descriptors: (*Refractory metals and alloys, Nickel alloys), (*Nickel alloys, Refractory metals and alloys), (*Cobalt alloys, Refractory metals and alloys), Chromium alloys, Welding, Fracture (Mechanics), Filaments, Wire, Forging, Heat treatment, Microstructure, Rupture, Carbides.

This is a brief review of recent developments in nickel-base and cobalt-base alloys. Rene 62 sheet is reported to be resistant to weld cracking. This characteristic, combined with somewhat higher strength than Inconel Alloy 718, makes Rene 62 a promising sheet material for service up to 1500 F. For the manufacture of superalloy filaments up to 100 feet in length by cold stretching, Elgiloy wire was selected for the preliminary development work because of its high room-temperature ductility and availability. Reductions in area of up to 50% were made on 10-mil-diameter wire; 40% reductions on 3-mil-diameter wire; and up to 30% reductions on 1-mil-diameter wire. The goal of producing 1/2-mil-diameter wire was not reached. Studies on the influence of forging temperature on the distribution and identity of the carbide phases in Waspaloy indicated that hot work history is a critical determinant in the microstructure of heat-treated wrought Waspaloy (and presumably other superalloys). Typical composition and characteristic rupture strength of the nickel-base alloy SM 211 were tabulated. (Author)

AD-432 203 Div. 17
OTS price $1.10

Defense Metals Information Center, Columbus, Ohio.
REVIEW OF RECENT DEVELOPMENTS. FIBER-REINFORCED MATERIALS,
by H. J. Wagner. 6 Mar 64, 3p.
Unclassified report

Descriptors: (*Reviews, Reinforcing materials), (*Reinforcing materials, Reviews), (*Metallic textiles, Reviews), (*Tungsten, Reinforcing materials), (*Aluminum compounds, Reinforcing materials), Copper alloys, Silver, Nickel alloys, Silver, Nickel alloys, Nickel, Cobalt alloys, Chromium alloys, Oxides, Single crystals, Wire, Fibers, Mechanical properties.

The stress-strain behavior of composites made by infiltrating bundles of W wire with molten Cu was reported by workers at NASA Lewis Research Center. NASA Lewis Research Center conducted a study to determine the effect of alloying the matrix on the tensile properties and microstructure of W-fiber-reinforced composites. Composites were made of W wires infiltrated with binary alloys of Cu with Al, Cr, Co, Nb, Ni, Ti, and Zr. In addition, selected Ni-base and Co-base alloys were used as matrices. Analysis of composites made by infiltrating alpha-Al2O3 whiskers with molten Ag showed that between 80 and 97% of the whiskers' strength can be utilized at room temperature. At temperatures exceeding 90% of the melting point of Ag, the utilization

factor is 30 to 60%. A composite made from Rene' 41 reinforced with fine alpha-Al2O3 was made with no apparent damage to the whiskers as a result of exposure to the liquid alloy during fabrication. (Author)

AD-432 273 Div. 17
OTS price $1.60

Brush Beryllium Co., Cleveland, Ohio.
DEVELOPMENT OF VERY HIGH STRENGTH BERYLLIUM WIRE.
Bimonthly rept. no. 1, 6 Dec 63-6 Feb 64,
by E. A. Murphy and R. G. O'Rourke. 6 Feb 64,
18p. Rept. no. TR341 243
Contract NOw64 0162c
Unclassified report

Descriptors: (*Beryllium alloys, Wire), (*Wire, Material forming), Iron alloys, Copper alloys, Beryllium compounds, Oxides, Powder metallurgy, Extrusion, Drawing (Machine processing), Chemical analysis, Particle size, Ductility.

Work directed toward development of a process to produce high-strength beryllium fine wire is described. Material selection and known chemistry is listed along with the extrusion data of these alloys. The beryllium-iron alloys, 1.2 to 0.8% Fe were found not adaptable for the fabrication technique described and will be replaced with an alloy having 0.4% Fe. Future plans include conversion of the extruded stock to wire by conventional warm-drawing techniques. (Author)

AD-432 317 Div. 17, 31
OTS price $5.60

Naval Research Lab., Washington, D. C.
METALLURGICAL CHARACTERISTICS OF HIGH STRENGTH STRUCTURAL MATERIALS.
Quarterly progress rept. no. 3,
by P. P. Puzak, K. B. Lloyd, R. J. Goode, R. W. Huber and D. G. Howe. Jan 64, 55p.
NRL 6086 Unclassified report

Descriptors: (*Steel, Submarine hulls), (*Titanium alloys, Submarine hulls), (*Metal plates, Fracture (Mechanics)), (*Submarine hulls, Materials), Heat treatment, Chemical analysis, Toughness, Test methods, Mechanical properties, Fatique (Mechanics), Strain (Mechanics), Stresses, Aluminum alloys, Molybdenum alloys, Temperature.

A progress report covering research studies in high strength, hull structural materials, conducted in the period of November 1963 to January 1964 is presented. These studies included the development of preliminary flaw size-stress relationships for fracture of quenched and tempered and maraging steels and of titanium alloys. Additional information was developed on the relationships of various fracture tests for these materials. Heat-treatment studies for steels and titanium alloys provided an expanded frame of reference for establishing the optimum fracture toughness level to be expected for specific levels of yield strength. The relationship of fatigue crack propagation rate to total strain range was determined for various quenched and tempered steels. (Author)

AD-432 318 Div. 17, 25
OTS price $1.60

Naval Research Lab., Washington, D. C.
PROPOSED PHASE DIAGRAM FOR THE SYSTEM MAGNESIUM OXIDE - VANADIUM PENTOXIDE.
Final rept.,
by A. J. Pollard. 14 Feb 64, 11p.
Proj. SR007 08 04 0617
NRL 6038 Unclassified report

Descriptors: (*Oxides, Phase studies), (*Vanadium compounds, Oxides), (*Magnesium compounds Oxides), (*Phase studies, Oxides), Melting, High-temperature research, Eutecitcs, X-ray diffraction analysis.

The liquidus-solidus regions of the system MgO-V2O5 were investigated over the entire composition range, with the following principal findings: There are two congruently melting compounds: 2MgO.V2O5 melting at 1128 C, and 3 MgO.V2O5 melting at 1210C. A thire compound, MgO.V2O5, is thought to have an incongruent melting point at 762C. There are three eutectics: one at approximately 15 mole-percent V2O5 melthing at 1192C, one at approximately 30 mole-percent V2O5 melting at 1122C, and one at approximately 75 mole-percent V2O5 melting at 658C. (Author)

AD-432 319 Div. 17
OTS price $5.60

Thompson Ramo Wooldridge Inc., Cleveland, Ohio.
DESIGN DATA STUDY FOR COATED COLUMBIUM ALLOYS II.
Bimonthly rept. no. 5, 1 Nov 63-1 Jan 64,
by D. B. Warmuth. 1 Feb 64, 58p. Rept. no. TM3866 67
Contract NOw63 0471c, Proj. 512 002292 88
Unclassified report

Descriptors: (*Niobium alloys, Protective treatment), (*Coatings, Niobium alloys), Sheets, High temperature research, Tensile properties, Creep, Strain (Mechanics), Deformation, Mechanical properties, Aerospace craft, Structural parts, Design, Heat shields, Transition temperature, Hardening, Silicides, Oxidation, Heat treatment, Temperature, Stresses, Ductility.

The major part of the Design Data Study mechanical property tests on Pfaudler and TRW coated 30 mil B-66 and D-43 niobium alloy sheet was completed. The results of tensile tests conducted on coated sheet in the temperature range room temperature to 2600 F are reported and compared with properties of uncoated sheet. A limited study of the effect of different tensile strain rates in the 2300 to 2600 F temperature range is discussed. Results of creep tests conducted on the coated B-66 and D-43 alloy sheet are reported. These data pertain to tests run at 1600, 2000, 2300 and 2600 F in air. Preliminary results of coating deformation tolerance tests at room temperature, 400 and 800 F are presented. (Author)

AD-432 320 Div. 17
OTS price $.50

Rock Island Arsenal Lab., Ill.
CONTROL OF STRESS CORROSION.
Interim rept.,
by R. H. Wolff. 26 Nov 63, 19p.
Proj. 1A024401A11005
RIAL 63 3890 Unclassified report

Descriptors: (*Steel, Fracture (Mechanics)), (*Stresses, Corrosion), Protective treatments, Corrosion inhibition, Coatings, Zinc coatings, Electroplating, Phosphate coatings, Environmental tests, Heat treatment, Abrasive blasting, Tensile properties.

This study of the control of stress corrosion cracking susceptibility of steels by application of protective coatings was designed to use abrasive blasted specimens to simulate more nearly the surfaces and conditions of a manufacturing operation. Initial work was conducted using specimens of aircraft quality 4130 alloy sheet steel, heat treated to 200,000 psi yield strength. Zinc was chosen as protective coating

and was applied to abrasive blasted bent beam specimens in three forms: by zinc electroplating, zinc phosphatizing, and by zinc dust dispersion. Coated bent beam specimens, tensile loaded at 75% of yield strength were placed in high humidity and in semi-industrial outdoor exposure. Control specimens in ''as heat treated'' condition have failed in both atmospheres. Tests are continuing. (Author)

AD-432 321 Div. 17
OTS price $.50

Naval Research Lab., Washington, D. C.
STRESS-CORROSION CRACKING AND RELATED PHENOMENA IN HIGH-STRENGTH STEELS. A REVIEW OF THE PROBLEM, WITH AN ANNOTATED BIBLIOGRAPHY,
by B. F. Brown. 6 Nov 63, 25p.
Task R05 24G
NRL 6041 Unclassified report

Descriptors: (*Steel, Fracture (Mechanics)), (*Stresses, Corrosion), Reviews, Hydrogen embrittlement, Electrochemistry, Theory, Toughness, Brittleness, Temperature, Transition temperature, Test methods, Bibliographies.

The problem of the stress-corrosion cracking of high-strength steels in contrasted with stress corrosion in other metals. The implications of hydrogen embrittlement and especially of brittle fracture to interpretations of stress-corrosion cracking tests on high-strength steels are summarized. Test methods are briefly described, and the results of recent studies as reported in the literature are summarized topically. A discussion of the meaning of these findings is given, together with recommendations regarding the further development of test concepts. An annotated bibliography of thirty-six entries is appended. (Author)

AD-432 390 Div. 17, 25
OTS price $3.60

National Technical U. (Greece).
THE VARIATION OF LATERAL CONTRACTION RATIO OF LOW-CARBON STEEL AT ELEVATED TEMPERATURES,
by P. S. Theocaris and E. Koroneos. 1964, 35p.
Contract DA91 591EUC2727
Unclassified report

Descriptors: (*Steel, Deformation), Elasticity, Plasticity, Strain (Mechanics), Stresses, High temperature research, Diffraction gratings, Interferometers, Photographic analysis, Temperature.

Low-strain rate tests on thin flat-bars at elevated temperatures were performed in a series of tensile specimens made of polycrystalline steel to reveal the influence of temperature on the variation of the lateral contraction ratio in the elastic as well as in the plastic domain of straining. The investigation covered two types of low-carbon steel designated as DIN St. 33 and DIN St. 42 respectively and one type of low-carbon high-yield-strength alloy steel quenched and tempered under commercial designation U.S.S. 'T1' (Author)

AD-432 420 Div. 17
OTS price $2.60

New England Materials Lab., Inc., Medford, Mass.
DISPERSION STRENGTHENED NICKEL-BASE ALLOYS.
Final rept., 1 Mar-31 Dec 63,
by A. S. Bufferd, R. C. Nelson and N. J. Grant.
24 Feb 64, 24p.
Contract N600 19 59891
Unclassified report

Descriptors: (*Nickel alloys, Dispersion hardening), (*Dispersion hardening, Thorium compounds), Chromium alloys, Cobalt alloys, Powder alloys, Powder metallurgy, Powder metals, Extrusion, Particle size, Tensile properties, High temperature research, Stresses, Rupture, Metallography, X-ray photography, Cold working, Microstructure, Oxides, Nitrates, Pyrolysis, Hardness.

The dispersion strengthening of 80 Nickel-20 Chromium and Udimet 500 Modified compositions was investigated with thorium oxide introduced by mechanical mixing or thermal decomposition techniques. Thermal decomposition of thorium nitrate onto 80 Nickel-20 Chromium powder produced a better degree of thorium oxide dispersion than mechanical mixing. The 100 hour rupture life stress of 80 Nickel-20 Chromium at 1800 F was increased from 1600 to 3400 psi with the addition of 5 vol.-% thorium oxide. In addition, the effect of further cold deformation after extrusion on properties was investigated with 2.5 and 5 vol.-% thorium oxide dispersions in 80 Nickel-20 Chromium. (Author)

AD-432 447 Div. 17
OTS price $2.60

Du Pont Metals Center, E. I. Du Pont De Nemours and Co. Inc., Baltimore, Md.
COLUMBIUM ''H'' SECTION PROGRAM PHASE I - EXTRUSION PHASE II - DRAWING.
Interim rept. no. 1, 1 July-1 Oct 63,
by E. V. Peterson. 1 Oct 63, 22p.
Contract AF33 657 11293, Proj. 8 110
Unclassified report

Descriptors: (*Niobium alloys, Material forming), (*Extrusion, Niobium alloys), (*Drawing (Machine processing), Niobium alloys), Tungsten alloys, Zirconium alloys, Carbon alloys, Dies, Design, Hot working, Melting, Vacuum furnaces, Electric arcs, Chemical analysis, Thickness, Surface properties.

Phase I goal is the extrusion of D-43 (Cb-10w-1Zr-0.1C) and Cb-752 (Cb-10W-2.5Zr) 'H' sections of specified size, with section thickness of 0.060 in, and lengths of at least 20 feet. Two 8-in. diameter ingots were melted of each alloy, converted to billets, and extruded to 3.7 in. diameter stock. Nine 3.4-in.-diameter billets were extruded to 'H' sections with thicknesses of 0.187 and 0.125 in. (extrusion ratios of 12.4:1 and 18.2:1), from 3400 F. Phase II goal is the drawing of extruded 'H' sections of the above alloys to specified size, with section thicknesses of 0.040 in., and lengths of at least 20 feet. (Author)

AD-432 451 Div. 17, 27
OTS price $8.10

Rocketdyne, Canoga Park, Calif.
RESEARCH IN THE FIELD OF LIQUID-METAL-LUBRICATED BEARINGS, PART I,
by J. Hall and R. Spies. Feb 64, 86p. Rept. no. R5438
Contract AF33 657 10553, Proj. 3044, Task 304402
RTD TDR63 4289, Pt. 1
Unclassified report

Descriptors: (*Liquid metals, Lubricants), (*Bearings, Lubrication), Journal bearings, Thrust bearings, Test equipment, Design, Calibration, Performance (Engineering), Space propulsion, Space environmental conditions, Potassium, Water.

A new general purpose test rig (GPTR) was constructed and checked out. Performance data obtained during a test run of over 700 hours dura-

tion were evaluated and the results are presented. Antiwhirl journal bearings of the hybrid type were designed and fabricated. Checkout series in the GPTR using water lubricant were performed preparatory to testing with potassium. The design of a special test rig (system simulation test rig) to be utilized in studying rotordynamic characteristics of typical space power systems with antiwhirl bearings was completed. This rig incorporates three potassium-lubricated test bearings, i.e., two journal bearings, and one thrust bearing. The current endurance test ring was redesigned for thrust bearing performance tests and fabrication is now under way. (Author)

AD-432 452 Div. 17
OTS price $1.60

Nuclear Metals Inc., Concord, Mass.
BERYLLIUM RESEARCH AND DEVELOPMENT PROGRAM.
Quarterly progress rept., 1 Jan-31 Mar 63.
Aug 63, 16p.
Contract AF33 616 7065, Tasks 73518 and 735104
Unclassified report

Descriptors: (*Beryllium, Material forming), (*Material forming, Powder metallurgy), Powder metals, Mechanical properties, Ductility, Aging (Materials), Heat treatment, Extrusion, Anisotropy, Single crystals, Tensile properties, Crystal growth, Grain structure (Metallurgy), Brittleness, Transition temperature, Resistance (Electrical), Strain (Mechanics), Stresses, Cryogenics, Low temperature research, Temperature.

The strength and ductility above room temperature of the hot-presses Brush and Pechiney powders being studied at Lockheed show the usual behavior for beryllium. This material exhibits little response to aging heat treatments. Extruded Brush and Pechiney beryllium possess greater strength and ductility in the transverse direction than in the longitudinal direction at temperatures below about 20 C. This appears to be due to twinning in the longitudinal specimens. Tensile specimens are being prepared at Nuclear Metals from single crystals of SR Pechiney and of single distilled beryllium. These crystals were obtained from metal melted and slowly cooled in BeO crucibles. (Author)

AD-432 476 Div. 17
OTS price $1.60

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH STRENGTH STEELS.
Informal monthly progress rept. no. 29, for Jan 64,
by W. L. Bruckart. Mar 64, 15p. Rept. no. L0414 02 5
Contract DA04 495ORD3069
Unclassified report

Descriptors: (*Steel, Corrosion), (*Fracture (Mechanics), Steel), (*Corrosion, Stresses), Nickel alloys, Martensite, Failure (Mechanics), Controlled atmospheres, Water, Air, Corrosive liquids, Sea water, Electric potential, Heat treatment, Mechanical properties, Aging (Materials).

AD-432 504 Div. 17
OTS price $2.50

Midwest Research Inst., Kansas City, Mo.
RESEARCH ON THE MECHANISMS OF FATIGUE.
Rept. for 1 Dec 61-31 Aug 63,
by J. C. Grosskreutz. Dec 63, 117p.
Contract AF33 616 7858, Proj. 7353, Task 735301
WADD TR60 313, pt. 2 Unclassified report

Report on Characterization of Solid Phase and Interphase Phenomena in Crystalline Substances.

Descriptors: (*Fatigue (Mechanics), Metallography), (*Aluminum, Grain structures (Metallurgy)), (*Stresses, Fracture (Mechanics)), Electron microscopy, X-ray diffraction analysis, Hardness, Coatings, Epoxy plastics, Effectiveness, Tensile properties, Copper alloys, Zinc alloys, Cryogenics.

The accumulation of fatigue damage was studied on a microscopic scale in polycrystalline aluminum cycled at constant strain. At moderate strain amplitudes, the dominant feature is a subgrain structure which originates with the clustering of dislocations into sub-boundaries during the first few hundred cycles of strain. At low strains, large concentrations of dislocation loops are formed, either near subgrain boundaries, or on glide planes in areas devoid of subgrains. These observations were used to construct a model of fatigue hardening which agrees with the published hardening curves for aluminum. (Author)

AD-432 669 Div. 17, 26
OTS price $1.60

New England Materials Lab., Inc., Medford, Mass.
HIGH TEMPERATURE DEFORMATION AND FRACTURE BEHAVIOR OF METALS UNDER HIGH STRAIN RATE CONDITIONS.
Progress rept. no. 4, 1 Nov 63-1 Jan 64,
by J. M. Dhosi, R. Widmer and N. J. Grant.
Jan 64, 13p.
Contract NOw63 0502
Unclassified report

Descriptors: (*Metals, Hot working), (*Beryllium alloys, Deformation), (*Nickel alloys, Deformation), Material forming, Strain (Mechanics), Stresses, High temperature research, Ductility, Temperature, Anisotropy, Transition temperature, Brittleness, Chromium alloys, Cobalt alloys.

AD-432 681 Div. 17, 30
OTS price $1.10

National Technical U. (Greece).
CREEP CHARACTERISTICS OF TENSION MEMBERS IN HIGH TEMPERATURES BY USING THE PHOTO-SCREEN METHOD.
Rept. for 1 Nov 62-31 Oct 63,
by Pericles S. Theocaris. 31 Oct 63, 5p.
Contract DA91 591EUC2727
Unclassified report

Descriptors: (*Creep, High temperature research), (*High temperature research, Creep), (*Tensile properties), Photographic recording media, Photographic recording systems, Steel, Alloys, Metals, Loading (Mechanics), Strain (Mechanics).

The photo-screen method as it was developed during the previous projects DA-91-591-EUC-1632 and 2021 was applied for the determination of the creep characteristics of various steels and alloys. The photo-screen method for differential moire method developed in the laboratory for Testing Materials was used for the analysis of strains and stresses in externally loaded bodies at elevated temperatures. A technique was developed to reproduce a crossed grating of a density of 500 lines per inch on the surface of the specimens in both principal directions. This grating resisted temperatures up to the flowing point of the material tested. The differential moire method was used for the measurement of relative displacements along the two principal directions of the specimens, from which the longitudinal and transverse components of strains

were derived. The influence of temperature on the instability phenomenon due to the nucleation and propagation of Luder's bands was studied. Conventional and true longitudinal and transverse stress-strain curves of these materials were traced at various increments of temperature from the ambient up to 450 C (850 F) and the resulting lateral contraction ratio true stress or strain curves were plotted. (Author)

AD-432 842 Div. 17
OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
ON THE MECHANISM OF STRENGTHENING IN MARAGING STEELS,
by H. Conrad. 21 Feb 64, 8p. Rept. no. TDR269 4240 10 10
Contract AF04 695 269
SSD TDR64 13 Unclassified report

Descriptors: (*Steel, Hardening), (*Hardening, Theory), Martensite, Aging (Materials), Cold working, Hot working, Heat treatment, Stresses, Strain (Mechanics), Temperature, Dispersion hardening.

To determine whether strengthening in maraging steels was associated with the thermal or athermal component of the stress, calculations were made from data by Bush (1963). Indications were that the principal strengthening mechanism is athermal in nature, and is due to the presence of long-range internal stresses, associated with a fine dispersion of precipitate particles. (Author)

AD-432 903 Div. 17
OTS price $1.60

Battersea Coll. of Tech. (Gt. Brit.).
USE OF REACTIVE ATMOSPHERES FOR THE TREATMENT OF B.C.C. METALS.
Quarterly engineering progress rept. no. 4 and 5, 1 Jul-31 Dec 63,
by R. L. Samuel, N. A. Lockington and I. J. Toth. Dec 63, 20p.
Contract N62558 3591
Unclassified report

Descriptors: (*Tungsten, Powder metals), (*Powder metals, Sintering), (*Controlled atmospheres, Bromine), Gases, Argon, Hydrogen, Induction heating, High frequency, Density, Measurement, High temperature research, Tungsten compounds, Bromides, Chlorides, Temperature, Powder metallurgy.

The activated sintering experiments on tungsten powder compacts were continued, using high frequency induction heating. Comparative tests showed that bromine increases the rate of densification in the temperature range 1200 to 1800 C, but high densities were not achieved. The graph of density plotted against sintering temperature indicates that activation may not occur, or may diminish, outside this temperature range. There is no time limitation. Fracture stress, measured by a miniature bend test, showed correlation with density for short sintering treatments; longer treatments gave anomalous results. (Author)

AD-432 923 Div. 17, 25
OTS price $4.60

Boeing Scientific Research Labs., Seattle, Wash.
CALORIMETRY OF INSTANTANEOUS HEAT SOURCES ARISING FROM PLASTIC TENSILE DEFORMATION AT LOW TEMPERATURES,
by Joachim C. Erdmann and James A. Jahoda.
Oct 63, 43p. Document no. D1 82 0311
Unclassified report

Also available from the author.

Descriptors: (*Deformation, Copper alloys), (*Cryogenics, Tensile properties), Nickel alloys, Calorimeters, Stresses, Heat, Cryostats, Integral transforms, Rods, Heat transfer, Functions, Theory, Strain (Mechanics), Thermometers.

A method is described to measure the thermal energy leaving a metal specimen under homogeneous and discontinuous plastic tensile deformation. It is based on the observation of thermal transients associated with the heat release. The evaluation procedure accounts for the influence of the inertia of the thermometers. Although the method is not restricted to low temperatures, it is most suitable at helium temperatures, where other means of calorimetry are less favorable. (Author)

AD-432 969 Div. 17
OTS price $2.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
DIFFUSION IN B.C.C. METALS,
by R. A. Wolfe and H. W. Paxton. 1 Mar 64, 28p.
Contract Nonr76008, Proj. NR031 184
Unclassified report

Doctoral thesis.

Descriptors: (*Metals, Diffusion), (*Diffusion, Tracer studies), Chromium alloys, Iron alloys, Chromium, Iron, Radioactive isotopes, Crystal lattices, Vanadium, Heat treatment, Temperature, High temperature research.

AD-432 974 Div. 17
OTS price $1.60

Army Materiel Command, Washinton, D. C.
PROGRAM PLAN FOR ADVANCED TECHNOLOGY OF CAST METALS.
25 Mar 63, 14p.
Unclassified report

Descriptors: (*Castings, Army research), (*Metallurgy, Research program administration), Casting, Freezing, Crystallization, Crystal growth, Nucleation, Specifications, Liquid metals, Fluid flow, Heat treatment, Processing, Manufacturing methods, Mechanical properties, Military requirements, Alloys, Metals, Molding materials, Casting alloys, Dispersion hardening, Heat transfer, Design, Steel, Aluminum alloys, Magnesium alloys.

AD-432 998 Div. 17, 25
OTS price $6.60

Massachusetts Inst. of Tech., Cambridge.
INVESTIGATION OF SOLIDIFICATION OF HIGH STRENGTH STEEL CASTINGS.
Interim Summary rept.
Dec 63, 69.
Contract DA19 0200RD5443X, Proj. 1A024401A110
AMRA CR63 04 2 Unclassified report

Descriptors: (*Steel, Castings), (*Crystallization, Steel), Melting, Deoxidation (Metallurgy), Casting, Cooling, Transformations, Heat treatment, Distribution, Chromium, Manganese, Nickel, Crystal structure, Microstructure, Porosity, Symmetry (Crystallography), Metallography, Solids, Freezing, Pearlite, Martensite, Bainite, Diffusion, Theory, Mathematical analysis, Grain structure (Metallurgy), Crystal growth, Temperature, Time, High temperature research.

Several aspects of dentritic structure were investigated in a unidirectionally solidified AISI 4340 steel. The distribution of manganese, chromium and nickel were determined; corresponding indices of segregation were calculated and their variation with location studied. The electron microprobe was used to determine isoconcentration curves in sections parallel and perpendicular to columnar dendrites. The dependence of the form of these curves upon solute concentration is discussed and isoconcentration surfaces defined. Conclusions are verified by metallographic studies on specimens subjected to isothermal transformation treatments. (Author)

AD-432 999 Div. 17, 25
OTS price $5.60

Massachusetts Inst. of Tech., Cambridge.
INVESTIGATION OF SOLIDIFICATION OF HIGH STRENGTH STEEL CASTINGS.
Interim summary rept., 9 Dec 61-8 Dec 62.
Dec 63, 51p.
Contract DA19 020ORD5443X, Proj. 1A024401A110
AMRA CR63 04 1 Unclassified report

Descriptors: (*Steel, Castings), (*Crystallization, Steel), Iron alloys, Nickel alloys, Melting, Cooling, Quenching (Cooling), Crystal structure, Grain structure (Metallurgy), Metallography, Crystal growth, Microstructure, Porosity, Etched crystals, Solids, Freezing, Diffusion, Nickel, Distribution, Temperature, Time, High temperature research.

A furnace with related apparatus for fully controlling solidification in small samples of iron-base alloys was completed and installed. Studies were conducted using the equipment to study solidification of an iron-nickel alloy. Emphasis of the work was on effect cooling rate on details of dendrite morphology and on microsegregation in a solute-rich system. At higher cooling rates, there is a tendency for formation of ''primary plates'' (filling in of interstices between primary and secondary arms during the early stages of solidification). At lower cooling rates, there is a tendency for formation of secondary plates (filling in of interstices between secondary and tertiary dendrite arms). Dendrite arm spacing increases linearly with the reciprocal of the square root of the cooling rate. Secondary and tertiary arm spacings are roughly equivalent. (Author)

AD-433 061 Div. 17
OTS price $3.60

Hydronautics Inc., Laurel, Md.
ON THE ROLE OF CORROSION IN CAVITATION DAMAGE.
by Sophia Waring, H. S. Preiser and A. Thiruvengadam. Feb 64, 38p. Rept. no. TR233 4
Contract Nonr 3755 00 FBM, Proj. NR062 293
Unclassified report

Descriptors: (*Cavitation, Corrosion), (*Corrosion, Cavitation), Steel, Aluminum alloys, Electrochemistry, Corrosive liquids, Chlorides, Sodium compounds, Test equipment, Magnetostriction, Polarization, Fatigue (Mechanics), Stainless steel.

The interacting influence of corrosion on cavitation damage was studied quantitatively using a magnetostrictive device. The relationship between the rate of weight loss and the amplitude of oscillation for 1020 mild steel became modified as the NaCl concentration was increased. When 1100-F aluminum was used, this relationship was not affected. An attempt was made to estimate the contribution of electrochemical corrosion to total damage by means of (1) static polarization measurements, (2) dynamic polarization measurements, (3) short-duration pulsing technique, and (4) long duration pulsing technique. (Author)

AD-433 095 Div. 17, 26, 25
OTS price $6.60

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Mary F. Banks. Feb 64, 66p.
Contract AF33 615 1121, Proj. 8975
Unclassified report

Descriptors: (*Metals, Abstracts), Indexes, Cobalt, Nickel, Steel, Iron, Beryllium, Titanium, Magnesium, Aluminum, Non-metals, Refractory metals & alloys, Niobium, Molybdenum, Tantalum, Vanadium, Tungsten, Metal coatings, Composite materials, Bibliographies.

AD-433 155 Div. 17
OTS price $2.60

Illinois Inst. of Tech., Chicago.
X-RAY K ABSORPTION SPECTRA OF NI-AL ALLOYS,
by Badri N. Das and Leonid V. Azaroff. Feb 64, 19p. Rept. no. TR64 1
Contract Nonr140607, Proj. NR031 684
Unclassified report

Descriptors: (*Absorption spectrum, X-rays), (*Nickel alloys, Aluminum alloys), Nickel, Atomic orbitals, Solid solutions, Crystal structure, Nuclear magnetic resonance, Line spectrum, Chemical bonds, Transition elements, X-ray spectroscopy, X-ray absorption analysis, Emissivity, Atomic energy levels, Metallography, X-ray diffraction analysis, Crystal lattices Aluminum.

The Ni K absorption spectra in five nickel-rich solid solutions and the intermediate phases Ni3Al, NiAl, and NiAl3 are presented. By considering the absorption process taking place within the nickel atoms, variations in the fine structure of the absorption spectra are interpreted in terms of the possible electronic structures of nickel atoms. It is demonstrated that the electronic structure changes markedly with composition in the a solid solution in a way suggestive of covalent bond formation. (Author)

AD-433 254 Div. 17
OTS price $3.60

General Electric Co., Schenectady, N. Y.
EFFECT OF BASIC PHYSICAL PARAMETERS ON ENGINEERING PROPERTIES OF INTERMETALLICS.
Rept. for Dec 62-Dec 63,
by J. H. Westbrook, H. E. Grenoble and D. L. Wood. Mar 64, 33p.
Contract AF33 616 7714, Proj. 7350, Task 735001
WADD TR60 184, pt. 5 Unclassified report

Report on Refractory Inorganic Non-Metallic Materials.

Descriptors: (*Nickel alloys, Mechanical properties), (*Aluminum alloys, Mechanical properties), (*Sheets, Nickel alloys), Intermetallic compounds, Rolling (Metallurgy), Brittleness, Ductility, High-temperature research, Crystals, Single crystals, Magnesium alloys, Silver alloys, Transition temperature, Electrolytic polishing, Processing, Grain

structure (Metallurgy), Deformation, Crystal structure, Symmetry (Crystallography), Microstructure.

Ingots of nickel-rich NiAl were prepared by induction melting under argon, starting with primary materials of technical grade. Sections cut from these ingots were hot-rolled to sheet at 1100 to 1200 C by enclosing them in heavy-walled stainless steel containers. Rolled sheet sufficiently free of defects to enable preparation of mechanical test specimens was obtained. Cold-rolling of the hot-rolled sheet can be accomplished at 850 C. Hot-rolled NiAl undergoes a transition to brittle behavior at about 600 C. Below this temperature the mechanical properties are characterized by limited ductility, a sensitivity to surface notches, and by a flow stress that is relatively invariant in respect to temperature. Above 600 C, ductility increases markedly, sensitivity to surface conditions diminishes, and the flow stress becomes strongly temperature dependent. Single crystals do not exhibit a transition in mechanical behavior and are much weaker and more ductile than polycrystalline materaial at temperatures below 800 C. (Author)

AD-433 286 Div. 17
OTS price $5.60

Thompson Ramo Wooldridge Inc., Cleveland, Ohio.
INFLUENCE OF ENVIRONMENT ON CRACK PROPAGATION AND DELAYED FAILURES IN HIGH-STRENGTH STEELS.
Rept. for Dec 62-Nov 63,
by G. L. Hanna and E. A. Steigerwald. Jan 64, 52p.
Contract AF33 657 7512, Proj. 7351, Task 735106
RTD TDR63 4225 Unclassified report

Descriptors: (*Steel, Failure (Mechanics)), (*Fracture (Mechanics), Propagation), Hydrogen embrittlement, Stresses, Corrosion, Stainless steel, Tool steel, Environmental tests, Water vapor, Air, Argon, Oxygen, Electric potential, Temperature, Fractography, Water, Heat treatment, Tensile properties, Chemical analysis.

Environmentally-induced crack propagation was studied in several classes of high-strength steels with particular emphasis on the influence of aqueous media. Low alloy martensitic steels, 4340 and 300M, were very susceptible to delayed failure in a water or moist air environment while an H-11 die steel was only moderately embrittled. Under the particular test conditions employed the precipitation-hardening and maraging steels were relatively unaffected by aqueous environments. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-431 273 Div. 18, 29
OTS price $8.60

Operations Research Inc., Silver Spring, Md.
EVALUATION OF CIVIL DEFENSE SYSTEMS. SHELTER UTILIZATION POLICIES IN MONTGOMERY COUNTY, MARYLAND,
by S. R. Parent and R. D. Lipps. Jan 64, 95p.
Technical rept. 236
Contract OCD OS62 187
Unclassified report

Descriptors: (*Civil Defense systems, Analysis), (*Shelters, Operation), Population, Design, Construction, Protective coverings, Feasibility studies.

Although the evaluations are made on the policies applying specifically to Montgomery County, some general conclusions may be made regarding the application of the policies and their probable effects in any area. An overriding interaction, which is evident at this point, is that generally the acquisition of additional suitable shelter space increases the advantages of assignment planning and decreases the advantages of overcrowding. Table 3 presents these general conclusions in the form of a binary good or bad. Also presented with the conclusions are several brief statements regarding the decisions and considerations as they are now understood. In some cases, general knowledge is not sufficient to support a conclusion; this is to be expected in initial studies of this nature. However, it is felt that these conclusions serve a heuristic purpose and may be a foundation for more universal policy evaluation. (Author)

AD-431 524 Div. 18
OTS price $1.60

RAND Corp., Santa Monica, Calif.
RESOURCE ANALYSIS IN MILITARY LONG-RANGE PLANNING,
by D. Novick. Feb 64, 14p. Rept. no. P2861
Unclassified report

Descriptors: (*Military strategy, Analysis), (*Department of defense, Military strategy), (*Costs, Analysis), (*Federal budgets, Military organizations), Military personnel, Decision making, Military facilities.

Military planning in the Department of Defense is now administered through the program budget procedure. This arrays the national security objectives in terms of major missions -- strategic retaliatory, continental defense, airlift and sealift and the like -- and the major strategic retaliation. In this process a wide range of alternative equipments are considered as well as varying possibilities for deploying or operating them. Each possibility is translated in terms of not only military effectiveness but also the cost of obtaining and operating that capability. In the past, there was a tendency to state military needs in terms of requirements only, that is, without reference to their costs. But military effectiveness or worth of any given weapon system must be considered in relation to its cost, that is, cost effectiveness relationships must be established and analyzed to provide the decision-makers with the appropriate illumination of the problems at each level of the program budget. Cost analysis provides the resource translations of effectiveness estimates developed by systems designers who have made the calculations of the equipment and operating concepts required to perform a specific mission. (Author)

AD-431 525 Div. 18, 32
OTS price $1.10

RAND Corp., Santa Monica, Calif.
THE PRINCIPAL ECONOMIC CONSIDERATIONS IN MAKING NATIONAL SECURITY POLICY,
by Robert A. Levine. Feb 64, 8p. Rept. no. P2870
Unclassified report

Descriptors: (*Economics, National defense), (*National defense, Economics), Costs, Effectiveness, Department of defense, Federal budgets, Military strategy.

AD-431 929 Div. 18, 32
OTS price $5.60

American U., Washington, D. C.
JUNGLE WARFARE BIBLIOGRAPHY,
by Margaret Mughisuddin, Barbara Reason Butler and Nancy Ann Gardner. Jan 64, 51p. Rept. no. RM64 2
Unclassified report

Descriptors: (*Guerrilla warfare, Bibliographies), Counterinsurgency, Abstracts, Labor, Military tactics, Jungles, Terrain, Climatology, Ecology, Military training, Military requirements, Military personnel.

Information on jungle terrain and climate, as they affect tactics, materiel, and manpower, is of interest to the U. S. Army because U. S. troops are daily involved in training for and advising on the conduct of warfare in the jungles of Africa, Asia, and Latin America. This bibliography presents articles and books containing information on experiences in jungle campaigns, suggestions for tactics tailored for use in jungles, and ways of training troops in jungle warfare. This material should be of use to Army schools. The items contained in this bibliography were reviewed in the course of maintaining a bibliographic survey of the unclassified, English-language sources of information on counterinsurgency. They are divided according to geographic area, and there is an Author-Title Index to aid the reader in locating items. (Author)

AD-432 257 Div. 18, 32
OTS price $1.60

RAND Corp., Santa Monica, Calif.
MECHANICS OF SOME LIMITED DISARMAMENT MEASURES. A SIMPLE ECONOMIC TREATMENT,
by Allen R. Ferguson. 17 Nov 60, rev. 23 Jan 61, 20p. Rept. no. P2140
Unclassified report

Presented at the American Economic Association Annual Meeting, St. Louis, Missouri, 28-30 Dec 60.

Descriptors: (*Disarmament, Economics), Management engineering, Weapons, Weapon systems, Control.

This paper deals with one small aspect of the rapidly growing field of arms control. Arms control, in current terminology, is considerably broader than disarmament. It embraces all problems ranging from total disarmament to the selective strengthening of armaments to increase

the stability of mutual deterrence. Problems of reducing the risk of war and of its devastation if it comes, the mechanics and tactics of negotiation, the politics and technology of inspection, the legal, military and political aspects of enforcement and sanctions, and the hard detailed analysis of the military impact of specific arms-control measures are all subjects of interest, research, and exposition. Although the field has a growing theoretical literature relating arms control to military strategy in general and to deterrence in particular, little has been written on arms limitation as a process relating to the e-onomics of military power. The present paper is addressed to only one specific question: How can disarmament measures affect the economics of military power. (Author)

AD-433 158 Div. 18, 32
OTS price $4.60

American U., Washington, D. C.
COUNTERINSURGENCY BIBLIOGRAPHY SUPPLEMENT NO. 2, by Margaret Mughisuddin. Mar 64, 44p. Rept. no. 64 4

Unclassified report

Supplement to AD-409 100.

Descriptors: (*Bibliographies, Counter-insurgency), (Counterinsurgency, Bibliographies), Models (Simulations), History, Military strategy, Guerrilla warfare, Population, Logistics, Foreign policy, Defense systems, Theory, Abstracts.

19. NAVIGATION

AD-431 581 Div. 19
OTS price $1.10

Naval Research Lab., Washington, D. C.
OMEGA MONITOR STATION AT LASHAM, ENGLAND.
Interim rept. no. 1,
by L. A. Fletcher. 10 Jan 64, 13p.
Proj. SS161 001 6154
NRL MR1496 Unclassified report

Descriptors: (*Very low frequency, Radio navigation), (*Radio navigation, Very low frequency), Propagation, Radio signals, Attenuation, Data, Radio stations, Radio transmitters.

NRL has recently established an Omega monitor at the RAE facilities at Lasham, England, to obtain diurnal phase shift and phase stability data on Omega signals from transmitters located in Forestport, New York; Haiku, Hawaii; and Summit, Canal Zone. The monitor utilizes a type AN/WRN-2(XN-1) Omega Navigation Receiver and associated support equipment and is operated by the Royal Aircraft Establishment, Ministry of Aviation, Great Britain. The data obtained from this monitor will be used in the evaluation of the Omega Navigation System. Preliminary data from the monitor show that signal strengths from the transmitters are sufficient for proper operation of the monitor at Lasham. (Author)

AD-431 677 Div. 19, 31
OTS price $17.50

Sperry Piedmont Co., Charlottesville, Va.
AUTOPILOT SYSTEM STUDY FOR HYDROFOIL CRAFT.
Final rept.,
by H. E. Harris, R. E. Smith, T. F. Noble and S. M. Ankney. 1962, 280p. Rept. no. JA250 0037
Contract NObs84420, Proj. SF0130201, Task 1709
Unclassified report

Descriptors: (*Hydrofoil boats, Automatic pilots), Automatic navigators, Control systems, Mathematical models, Motion, Performance (Engineering), Take-off, Landings, Accelerometers, Gyroscopes, Reliability, Water waves, Pitch (Motion), Moments, Functions, Matrix algebra.

This study is a part of a hydrofoil research program now being carried out by various agencies under the auspecies of the Department of the Navy, Bureau of Ships. The function of this program is to meet an obvious need for quantitative goals and specifications to guide the design of hydrofoil systems and the components going into these systems. This report is concerned primarily with the theory of controlled hydrofoil supported craft and the practical considerations of implementing the automatic control system. The analysis and design which follows is intended to provide an understanding of the possibilities and limitations of the performance of submerged foil hydrofoil craft, and hence a rational basis for choosing the most effective control system. In addition the problems and proposed solutions of controlled hydrofoil design are formulated and explicated in more detail than has been done previously. (Author)

AD-431 727 Div. 19, 20
OTS price $2.50

General Precision Lab., Inc., Pleasantville, N. Y.
EXPERIMENTAL MODEL OF NUCLEAR GYRO.
Rept. for Apr 61-Apr 63,
by James H. Simpson. Jan 64, 114p.
Contract AF33 616 8329, Proj. 4431, Task 443110
ASD TDR63 837 Unclassified report

Descriptors: (*Gyroscopes, Nuclear magnetic moments), Nuclear magnetic resonance, Mercury, Isotopes, Rotation, Oscillators, Errors, Feasibility studies, Magnetic fields, Pumping (Electronics), Drift, Wiring diagrams, Magnetic amplifiers, Dipole moments, Models (Simulations).

The feasibility model and the experimental model of the nuclear gyroscope were operated, and analyses of the gyro performance were made for the purposes of determining the state of the art of the nuclear gyroscope. The performance data indicate that a device with a potentially useful accuracy can be constructed using techniques with which the rotation information is derived from a collection of atomic nuclei. The rotation information is obtained from a comparison of the phases of the precession of the nuclei Hg(199) and Hg(201) in the same magnetic field as the outputs of nuclear magnetic resonance controlled oscillators. Optical pumping techniques were used to enhance the nuclear orientation and to monitor the precession of the nuclear magnetizations. (Author)

AD-432 079 Div. 19
OTS price $16.50

Foreign Tech. Div. Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INERTIAL NAVIGATION,
by I. A. Gorenshteyn, I. A. Shul'man and A. S. Safaryn. 13 Jan 64, 259p.
FTD TT63 474 Unclassified report

Trans. from Analiz i Raschet Usilitel'nykh Skhem pp. 1-244; 1963.

Descriptors: (*Inertial navigation, Theory), Gyroscopes, Magnetohydrodynamics, Accelerometers, Corrections, Design, Torque, Computers, Digital computers, Navigation computers, Cryogenics, Textbooks.

This book deals with the theoretical basis of inertial navigation. Foreign literature is drawn upon as regards the basic methods of constructing inertial guidance systems, or preparing these systems for operation and of correcting them; the basic elements of the inertial systems (gyros, accelerometers, torque and angle units, computing devices) are reviewed; the state and aspects of these elements are discussed. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-431 227 Div. 20
OTS price $3.60

Naval Radiological Defense Lab., San Francisco, Calif.
FRACTIONATION IV. ILLUSTRATIVE CALCULATIONS OF THE EFFECT OF RADIONUCLIDE FRACTIONATION ON EXPOSURE-DOSE RATE FROM LOCAL FALLOUT,
by E. C. Freiling, M. A. Kay and J. V. Sanderson. 6 Jan 64, 36p.
NRDL TR715 Unclassified report

Descriptors: (*Radioactive fallout, Density), (*Fission product activity, Radioactive fallout), Exposure, Dose-rate, Radiological contamination, Surface area, Mathematical prediction, Particle size, Decay schemes.

This report illustrates a proposed definition of surface density of contamination for the deposit of fractionated fallout. The illustrations employed give estimates of the dependence of exposure-dose rate on the degree of radionuclide fractionation and of the sensitivity of this dependence to independent fission yield input data, total yield of the device, and time of exposure. (Author)

AD-431 660 Div. 20, 25
OTS price $5.60

Maryland U., College park.
THE WIDTH OF GIANT RESONANCES IN HEAVY NUCLEI,
by Michael Danos and Walter Grenier. Feb 64, 51p. Technical rept. no. 354
Contract Nonr595 10
Unclassified report

In cooperation with National Bureau of Standards, Wash., D. C.

Descriptors: (*Nuclear resonance, Damping), Nuclear scattering, Nuclei, Inelastic scattering, Nuclear shell models, Perturbation theory, Proton scattering, Neutron scattering, Quantum mechanics, Nuclear cross sections.

In heavy nuclei the damping of the giant resonance is due to thermalization of the energy rather than to direct emission of particles; the latter process is strongly inhibited by the angular momentum barrier. The thermalization proceeds via inelastic collisions leading from the particle-hole state to two-particle two-hole states. In heavy nuclei several hundred such states are available at the energy of the giant dipole resonance. The rather large width of the giant resonance arises from the addition of many small partial widths of channels leading to the different two-particle two-hole states. Both the density of the two-particle two-hole states and the mean value of the matrix elements are evaluated in a simplified square well shell model. (Author)

AD-431 671 Div. 20
OTS price $1.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
COMPARISON OF EXPERIMENTAL AND THEORETICAL GAMMA RAY ALBEDO,
by C. M. Huddleston. 10 Jan 64, 9p.
Proj. Y F008 08 05 201
NCEL TN567 Unclassified report

Descriptors: (*Albedo, Concrete), (*Concrete, Gamma-ray scattering), Reactor reflectors, Monte carlo method, Shielding.

An intercomparison is made between the results of Monte Carlo calculations and two independent experimental determinations of values for the differential dose albedo of gamma rays on concrete. The validity of a semiempirical formula for gamma-ray albedo is examined. Information is presented on the current status of our knowledge of gamma-ray albedo, and the direction of future work is indicated. (Author)

AD-431 760 Div. 20
OTS price $1.60

Naval Research Lab., Washington, D. C.
INTERCALIBRATION OF THE MAJOR NORTH AMERICAN NETWORKS EMPLOYED IN MONITORING AIRBORNE FISSION PRODUCTS,
by L. B. Lockhart, Jr. and R. L. Patterson, Jr. 27 Dec 63, 17p.
NRL 6025 Unclassified report

Descriptors: (*Fission product activity, Radiation monitors), (*Radiation monitors, Fission product activity), Instrumentation, Atmosphere, Beta particles, Collecting methods, Sampling, Radiation measurement systems, Radioactivity.

Simultaneous collections of airborne fission products on filters identical to those used by the major air monitoring networks presently operating in North America were made by NRL at Washington, D.C. during June 1963. The filters were returned to each of the cooperating agencies for evaluation of their gross radioactivity content. The results were returned to the U.S. Naval Research Laboratory for tabulation and evaluation. The relative interconversion factors which are derived from the experimentally determined radioactivity concentrations are as follows: U.S. Public Health Service Radiation Surveillance Network, 1.00; Canadian Radiation Protection Division Network, 1.28; U.S. A.E.C. Health and Safety Laboratory 80th Meridian Network, 1.29; Mexican Radiation Protection Program Network, 1.58; and U.S. Public Health Service National Air Sampling Network, 1.77. The variable associated with the volume of air sampled has been eliminated in this study; the above factors relate solely to the evaluation of the combined effect of filter performance and counting techniques employed by the various networks. Recommendations toward improving the reliability of the radioactivity data from air-monitoring networks have been made and a simple procedure suggested for future intercalibrations. (Author)

AD-431 995 Div. 20
OTS price $1.60

Research Triangle Inst., Durham, N. C.
1115A - ANALYSIS OF SURVEY DATA.
Final summary rept.,
by E. L. Hill, W. K. Grogan, R. O. Lyday and H. G. Norment. 15 Feb 64, 13p. Rept. no. OU81
Contract OCD OS62 144
Unclassified report

Descriptors: (*Radioactive fallout, Shelters), (*Experimental data, Reliability), Analysis, Errors, Programming (Computers), Urban areas, Civil defense systems, Operations research.

A review is presented of the National Fallout Shelter Survey findings to estimate probable error, or reliability in the light of existing experimental data and theoretical considerations.

In consultation with the Subcommittee on Shielding of the Advisory Committee on Civil Defense, Categorize the surveyed structures with respect to technical shielding characteristics, and evaluate the feasibility and importance of developing special computational programs for the several categories determined. Evaluate new information on shielding for application to the computation of protection factors for surveyed structures. Accomplish reprogramming or additional programming of computational procedures for analysis of the survey data. (Author)

AD-432 143 Div. 20, 25
OTS price $1.10

Alabama U., University.
SUBMILLIMETER RADIATION FROM RELATIVISTIC ELECTRONS.
Final technical rept.
3 May 63, 5p.
Grant AF AFOSR61 69
Unclassified report

Descriptors: (*Electron beams, Millimeter waves), (*Millimeter waves, Relativity theory), Electron accelerators, Waveguides, Linear accelerators, Design.

AD-432 153 Div. 20
OTS price $3.60

Isotopes, Inc., Westwood, N. J.
PROJECT STAR DUST.
Quarterly rept. no. 7,
by James P. Friend, Herbert W. Feely and Micah W. M. Leo. 1 Feb 63, 38p.
Contract DA49 146XZ079
DASA 1307 Unclassified report

Descriptors: (*Radioactive fallout, Mathematical models), Atmospheric motion, Air mass analysis, High altitude, Stratosphere, Sampling, Rhodium, Strontium, Beta particles, Isotopes.

Contents: The Stratospheric Concentrations of Nuclear Debris During 1962--Concentrations of Total Beta Activity, Concentrations of Strontium-90 Activity, Concentrations of Products of Neutron Activation, Concentrations of Rhodium-102; and Carbon-14 Concentrations in Ground-level Air.

AD-432 232 Div. 20, 25
OTS price $1.60

Flight Dynamics Div., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
A NEW METHOD OF MEASURING THE CONSUMPTION OF LIQUIDS WITH THE USE OF NUCLEAR MAGNETIC RESONANCE,
by A. I. Zhernovoi and tr. by Paul Polishuk.
30 Jan 64, 12p.
Proj. 8222, Tasks 822203, 822213
FDCL TM64 2 Unclassified report

Descriptors: (*Nuclear magnetic resonance, Liquids), Magnetic fields, Polarization, Magnet coils, Signal-to-noise ratio, Fluid flow, Magnetohydrodynamics, Measurement.

AD-432 234 Div. 20, 12
OTS price $2.75

Northrop Space Labs., Hawthorne, Calif.
DESIGN CRITERIA FOR RADIATION RESISTANT FLIGHT CONTROL SYSTEMS FOR AEROSPACE VEHICLES.
Final rept.,
by M. C. Chapman. Apr 63, 135p.
Contract AF33 657 7851, Proj. 82222, Task 822204
ASD TDR63 75 Unclassified report

Descriptors: (*Aerospace craft, Radiation damage), (*Radiation damage, Aerospace craft), Space environmental conditions, Flight control systems, Van Allen radiation belt, Solar flares, Solar wind, Cosmic rays, Mission profiles, Radiological dosage, Dose rate, Bremsstrahlung, Protons, Penetration, Electrons, Neutrons, Gamma rays, Lunar probes, Orbital trajectories, Design.

Physical data were determined to establish design criteria for radiation-resistant flight control systems in aerospace vehicles operating in near-earth space regions. The objective was accomplished by investigating a general flight control system on a component and material level, and then discussing overall implications for the system. The radiation environment to be encountered is defined, and consists of Van Allen zones, solar flares, solar winds, and galactic cosmic rays. The intensity spectra were defined and computed to calculate the penetration of the radiation through vehicle skins. Proton, electron, and bremsstrahlung radiation penetrations are calculated. The resultant doses and flux exposures to the system's components are determined for four representative missions: a 2000-mile altitude circular orbit, a 21,500-mile altitude circular orbit, a high eccentricity elliptical orbit, and a lunar probe. Criteria necessary for utilizing neutron and gamma doses to discuss radiation damage are determined, including a state-of-the-art discussion of space-nuclear radiation correlation techniques. (Author)

AD-432 265 Div. 20
OTS price $1.75

Research and Technology Div., Air Force Systems Command, Wash. D. C.
RADIOACTIVE DECAY OF KRYPTON-79.
Rept. for Dec 61-June 62,
by Paul Polishuk and Henry P. Kalapaca. Dec 63, 66p.
Projs. 8222, 7001, Tasks 822213, 700109
RTD TDR63 4086 Unclassified report

Report on Control Data System and Instrumentation Technology for Advanced Aerospace Nuclear Vehicles.

Descriptors: (*Krypton, Radioactive decay), (*Decay schemes, Krypton), Gamma-ray spectroscopy, Instrumentation, Coincidence counting, Beta decay, Gamma emission, Isomeric transistions, Radioactive isotopes.

The decay of Kr-79 has been studied using various gamma spectroscopy techniques. Besides new results on the decay of Kr-79, a detailed procedure is presented for setting up, checking out, and operating a fast-slow coincidence circuit and other auxiliary equipment required in this research. Results of this study indicate that the decay scheme of Kr-79, proposed by Thulin et al requires revision. A revision to the decay scheme is proposed. (Author)

AD-432 342 Div. 20
OTS price $3.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 72, PART I.

Rept. for 1-29 Feb 64.
10 Mar 64, 34p. Rept. no. AL72
Contract AF33 615 1124
Unclassified report

Descriptors: (*Radiation damage, Materials), (*Abstracts, Radioactivity), Ceramic materials, Organic materials, Organic cooled reactors, Polymers, Elastomers, Inorganic compounds, Electronic equipment, Transducers, Strain gages, Transistors, Space environmental conditions, Radiation measurement systems, Lubricants.

AD-432 345 Div. 20
OTS price $16.50

Tracerlab Inc., Richmond, Calif.
RADIOLOGICAL MONITORING STUDY.
by A. L. Baietti and A. Zirkes. 15 Nov 63, 251p.
Contract OCD OS 62 151
Unclassified report

Descriptors: (*Radiation monitors, Civil defense systems), (*Radioactive fallout, Radiation measurement systems), Mobile, Nuclear warfare, Radiation hazards, Mathematical models, Costs, Vehicles, Pneumatic systems, Warning systems, Detectors, Dose rate, Data processing systems, Communication systems.

This study evaluated radiological monitoring systems for use following a nuclear attack. The recommended system uses a combination of Flash Reports for preparing fallout contour maps, Unshielded Land Vehicles, and Monitoring on Foot. The major advantages of this combination are low cost, simplicity, and low personnel exposure. (Author)

AD-432 360 Div. 20, 25
OTS price $1.10

Kansas U., Lawrence.
(No title).
Status Rept., 1 Sep-1 Dec 63,
by R. C. Sapp, and J. W. Culvahouse. 1 Dec 63, 4p.
Contract Nonr277500, Task NR018 202
Unclassified report

Descriptors: (*Nuclear spin, Relaxation time), (*Paramagnetic resonance, Crystal lattices), Neodynium, Nitrates, Cerium, Phonons, Ions.

AD-432 442 Div. 20
OTS price $1.60

Queen's U., Belfast (Gt. Brit.).
A SIMPLIFIED HARTREE-FOCK PROCEDURE FOR ATOMS WITH TWO ELECTRONS OUTSIDE CLOSED SHELLS,
by C. D. H. Chisholm and U. Opik. 1964, 17p.
Contract N62558 3634
Unclassified report

Descriptors: (*Atomic energy levels, Atomic orbitals), (*Electron transitions, Atomic energy levels), Quantum mechanics, Atomic properties, Mathematical models, Differential equations.

AD-432 450 Div. 20
OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
THE CONTAMINATION OF MILK BY RADIONUCLIDES IN FALLOUT,
by Carl F. Miller. Oct 63, 20p.
SRI Proj. IMU4021
Unclassified report

Descriptors: (*Radioactive isotopes, Absorption (Biological)), Mathematical models, Radioactive fallout, Strontium, Tellurium, Iodine, Milk (Food), Gamma rays, Radiological contamination.

AD-432 686 Div. 20
OTS price $3.60

Air Force Special Weapons Center, Kirtland Air Force Base (N. Mex.).
PASSIVE DOSIMETRY ANALYSIS TECHNIQUES,
by Richard Griffith, Harry Murphy and Donald Wood. Jan 64, 35p.
Proj. 7806, Task 780604
AFSWC TDR62 107 Unclassified report

Descriptors: (*Dosimeters, Radiation measurement systems), (*Radiation measurement systems, Nuclear energy levels), Gamma rays, Neutron flux, Thermal neutrons, Scintillation counters, Fast neutrons.

This report summarizes those techniques required to analyze standard neutron foil and gamma dosimetry. Levels of accuracy and the conditions under which they can be obtained are discussed. Techniques involve total gamma dose measurement, total neutron flux measurement, and determination of a six-group neutron-energy spectrum. (Author)

AD-432 860 Div. 20
OTS price $1.60

Litton Systems Inc., Woodland Hills, Calif.
(No title).
Progress rept. for Jun 63.
Jun 63, 14p.
Contract AF33 657 10584
Unclassified report

Descriptors: (*Research reactors, Malfunctions), Boiling water reactors, Amplifiers.

AD-432 876 Div. 20
OTS price $4.60

Pennsylvania State U., Coll. of Engineering and Architecture, University Park.
EVALUATION OF THE SHIELDING CHARACTERISTICS OF STRUCTURES FOR SIMULATED RESIDUAL RADIATION,
by L. Degelman, A. Foderaro and G. Kowal.
Nov 63, 64p. Rept. no. NUC E15
Contract DA18 108AMC24A
Unclassified report

Descriptors: (*Radioactive fallout, Shielding), (*Shielding, Radioactive fallout), Concrete, Dose rate, Determination, Gamma rays.

A semiempirical expression was developed for the gamma ray dose rate at any point within a concrete structure resulting from a point isotropic source lying anywhere on the ground outside the structure. This point-to-point kernel was integrated over an infinite area to check existing theories of fallout protection and to determine the variation of dose rate as a function of position within the structure. (Author)

AD-433 141 Div. 20
OTS price $12.50

Naval Radiological Defense Lab., San Francisco, Calif.
RADIOLOGICAL RECOVERY OF LAND TARGET COMPONENTS-

COMPLEX III,
by W. L. Owen and J. D. Sartor. 20 Nov 63, 171p.
Task 3212A
NRDL TR700 Unclassified report

Descriptors: (*Radioactive fallout, Countermeasures), (*Decontamination, Radioactive fallout), Recovery, Nuclear explosions, Radiation hazards, Radiological contamination, Radiation monitors, Dose rate, Instrumentation, Dosimeters, Meteorological parameters.

AD-433 154 Div. 20
OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
TENTATIVE PROCEDURES FOR MEASURING NEUTRON FLUX BY RADIOACTIVATION TECHNIQUES,
by J. B. Trice and J. S. Wechsler. Feb 64, 33p.
Rept. no. R64SD10
Unclassified report

Descriptors: (*Neutron flux, Radioactivation analysis), (*Radioactivation analysis, Neutron flux), Nuclear cross sections, Decay schemes, Reactor lattice parameters, Fast neutrons, Thermal neutrons, Detectors, Neutron cross section, Radioactive decay, Neutron counters, Neutron detectors.

A general method is described for measuring reactor neutron flux energy spectral parameters by means of materials activation. Nuclear properties of the materials such as cross sections and decay schemes, counting methods and data analyses are disucssed. Particular attention is given to the use of uniform procedures for obtaining reproducible measurements. The use of resonance elements for measuring the epithermal region, and so-called threshold detectors for analysis of the higher energies are described. (Author)

21. NUCLEAR PROPULSION

AD-432 018 Div. 21
OTS price $.75

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CONTROLLED THERMONUCLEAR REACTIONS FOR SPACE PROPULSION,
by Robert F. Cooper and Richard L. Verga. Sep 63, 27p.
ASD TDR63 696 Unclassified report

Presented at the ASD 1963 Science and Engineering Symposium, 18-19 Sep 63, at Wright-Patterson Air Force Base, Ohio.

Descriptors: (*Space propulsion, Thermonuclear reactions), (*Nuclear propulsion, Spacecraft), Thrust, Temperature, Design, Control, Space flight.

A propulsion system utilizing controlled thermonuclear reactions as an energy source is shown to possess definite advantages over all other propulsion systems in the performance of those space missions requiring a high velocity increment. No valid argument exists which indicates that controlled fusion will not be achieved. In addition, analyses indicate that no insoluble engineering problems would be associated with the adaption of controlled fusion to the propulsion of a space vehicle. A number of applicable areas of technology are discussed. These areas are either being pursued at the present time or require additional intensive effort. The inherent potential of the application is such that pursuit of this energy source for propulsion cannot be ignored or delayed. (Author)

22. ORDNANCE

AD-431 529 Div. 22
OTS price $3.60

Picatinny Arsenal, Dover, N. J.
MALFUNCTION INVESTIGATION OF CARTRIDGE, 105MM HOWITZER: GAS, NONPERSISTENT, GB, M360, DUALGRAN W/BURSTER, M40, W/FUZE, PD, M508,
by Joseph F. Ciccia. Feb 64, 35p.
PA TR3151 Unclassified report

Descriptors: (*Cartridges, Malfunctions), Projectile fuzes, Howitzers, Temperature, Test methods, Safety.

Prematures which occurred with M360 Cartridges fired from the XM103E3 Howitzer were probably caused by conditioning and firing rounds at a temperature (+155 F) exceeding the melting point (+154.6 F) of the tetrytol used in the M40 Burster. Defects observed, such as contaminated bursters and undersized felt pads, could have caused prematures. (Author)

AD-431 530 Div. 22
OTS price $2.60

Picatinny Arsenal, Dover, N. J.
MALFUNCTION INVESTIGATION OF CARTRIDGE, 106MM: HEAT, M344A1 W/FUZE, PIBD, M509; LOT IOP-7-5 (MIF A-138-61),
by William I. Gaston. Feb 64, 22p.
PA TR3144 Unclassified report

Descriptors: (*Cartridges, Malfunctions), Brazing, Point initiating fuzes, Base detonating fuzes, Attachment, Recoiless guns, Joints, Failure (Mechanics), Fracture (Mechanics).

On two occasions during a day's firing, the flash tube became detached from the rest of the primer assembly and, when the cartridge case was extracted, the flash tube stayed in the gun tube. It was removed manually each time. Forty-nine primers from the malfunctioned lot of cartridges were pull tested. All pulled at values in excess of the specification requirement, but two pulled at values only slightly in excess of the requirement. These showed poor distribution of brazing material. One of the malfunctioned primers was examined. There was no evidence of brazing compound on the internal surface of the head. (Author)

AD-431 691 Div. 22, 9, 2
OTS price $3.60

National Marine Consultants, Div. of Interstate Electronics Corp., Anaheim, Calif.
WATER WAVES PRODUCED BY IMPULSIVE ENERGY SOURCES PART IV: SUBSURFACE GENERATION: NUMERICAL PROCEDURE,
by Robert W. Whalin. Jan 63, 38p. Rept. no. ONR62, pt. 4
Contract Nonr3678 00
Unclassified report

Descriptors: (*Underwater explosions, Numerical analysis), (*Water waves, Propagation), Surfaces, Velocity, Wave transmission, Incompressible flow, Fluid flow, Integration.

The following study presents an explicit numerical procedure for finding the position of the free surface and the velocities at the free surface due to a deep explosion. The computational time involved with this procedure will be considerably less than that involved if one were to use the explicit analytical solution given in Progress Report I of this series. The procedure suggested is analogous to that suggested in Progress Report II, and was made possible only after the series representing the velocity potential was shown to be absolutely convergent. (Author)

AD-431 692 Div. 22, 9, 2
OTS price $6.60

National Marine Consultants, Div. of Interstate Electronics Corp., Anaheim, Calif.
WATER WAVES PRODUCED BY IMPULSIVE ENERGY SOURCES PART V: PROPAGATION.
Sep 63, 67p. Rept. no. ONR62, pt. 5
Contract Nonr3678 00
Unclassified report

Descriptors: (*Water waves, Propagation), (*Numerical analysis, Linear systems), Mathematical models, Integration, Theory, Underwater explosion, Surfaces, Functions, Polynomials, Motion, Deformation.

The propagation of waves in a cylindrically symmetric system is considered. The generating function is assumed known and may be one of the following forms: (1.) An initial displacement, (2.) An initial impulse, (3.) An initial shape and initial velocity distribution. Linear propagation theory is considered and a numerical integration procedure is developed for the evaluation of the well known Kranzer-Keller exact integral equations. Through this approach, it is possible to avoid the approximation $R \ll r$, and the stationary phase approximation, both of which are inadequate in certain regions. (Author)

AD-431 736 Div. 22
OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
TEMPERATURE-YIELD STRENGTH CORRELATION OF THE CRATER SIZE PRODUCED IN ALUMINUM BY THE HYPERVELOCITY IMPACT OF ALUMINUM SPHERES,
by R. Piacesi, R, H. Waser and V. C. D. Dawson.
30 Aug 63, 15p.
NOL TR63 142 Unclassified report

Descriptors: (*Ballistics, Hypervelocity projectiles), (*Impact shock, Cratering), (*Targets, Temperature), Aluminum, Spheres.

An investigation was made to determine the correlation between target temperature and target yield strength for the hypervelocity impact of aluminum spheres upon semi-infinite aluminum targets. It was shown that exact correlation does exist. In the velocity range covered in the experiment (12,700 feet per second to 21,750 feet per second) the crater volume was dependent on the -.396 power of the yield strength. It was also observed that a transition region exists at an impact velocity of about 13,000 feet per second, such that the crater volume is not linearly dependent on the kinetic energy of the projectile, but that for velocities from 13,000 feet per second and up to at least 21,750 feet per second the crater volume is dependent on the velocity to the 1.78 power. (Author)

AD-431 785 Div. 22
OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
INITIATION OF EXPLOSIVES BY EXPLODING WIRES,
by Howard S. Leopold. 15 May 63, 25p.
NOL TR63 244 Unclassified report

Descriptors: (*Exploding wires, Explosive initiators), PETN, Circuits, Resistance (Electrical), Experimental data, Explosive materials, Platinum, Wire, Electric currents, Detonations, Capacitors, Firing circuit, Oscillographs, Electric potential, Energy.

The effects of circuit resistance and bridge-wire length on the initiation of PETN by exploding 1 mil diameter platinum wires were investigated. A one microfarad capacitor charged to 2000 volts was used as the energy source. Increasing circuit resistance reduces the current density and the energy input to the wire lowering the probability of production detonation in PETN. The importance of keeping the extraneous circuit resistance to an absolute minimum is shown. (Author)

AD-431 786 Div. 22
OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
THE DEVELOPMENT OF THE DETONATOR, DELAY, WOX-60A,
by Vincent J. Menichelli and Calvin L. Scott.
Nov 63, 23p.
NOL TR63 256 Unclassified report

Descriptors: (*Delay elements (Explosive), Detonators), (*Detonators, Depth charges), Handling, Environmental tests, Temperature, Humidity, Vacuum, Steam, Pressure, Tests, Stresses, Fracture (Mechanics), Seals (Stoppers), Safety devices, Arming devices, Explosives initiators, Experimental data, Microstructure, Depth charge components, Underwater ordnance, Failure (Mechanics), Underwater sound signals.

A stab-initiated, hermetically sealed, nominal 3.5 second delay detonator has been developed for use in an underwater sound signal. The detonator is 0.806 inch maximum long, 0.300 inch maximum in diameter. It has passed all standard Navy rough handling and environmental tests except the Temperature, Humidity Cycling Test (Mil Std 304) and the Vacuum, Steam, Pressure Test (Mil Std 305). Failure in these tests occurred because of stress cracks in the end seals. Measures have been taken to correct this problem. (Author)

AD-431 918 Div. 22
OTS price $2.60

Bureau of Mines, Pittsburgh, Pa.
HYPERVELOCITY INPACT PHENOMENA
Quarterly rept.,
by Richard W. Watson, Karl R. Becker and Frank C. Gibson. 5 Feb 64, 30p.
Unclassified report

Descriptors: (*Hypervelocity guns, Projectors (Ordance)), (*Hypervelocity projectiles, Impact shock), Shock waves, Metals, Targets, Pressures, Experimental data, Aluminum alloys, Magnesium alloys, Steel, Impact shock, Hypervelocity projectiles, Velocity, Cratering, Lead, Radiography, Terminal ballistics.

This report on Hypervelocity Impact Phenomena consists of two sections describing methods and analyses of behind target effects in three metals and the development and performance of two new explosive projector systems that are to be applied to subsequent investigations of hypervelocity impact. (Author)

AD-431 941 Div. 22, 30
OTS price $2.60

Feltman Research and Engineering Labs., Picatinny Arsenal, Dover, N. J.
A NUMERICAL CODE FOR DETERMINING VELOCITIES OF EXPLOSIVELY ACCELERATED FRAGMENTS FOR ONE-DIMENSIONAL SLAB GEOMETRIES,
by James C. Pearson. Jan 64, 29p.
Proj. 1C222901A21001
PA TR3125 Unclassified report

Descriptors: (*Programming (Computers), Fragmentation), (*Fragmentation, Velocities), Fluid dynamic properties, Equations, Equations of state, Velocities, Detonations, Fluid mechanics, Fragmentation ammunition, One-dimensional flow, Warheads, Metal plates, Acceleration, Aluminum.

This report presents a computer program which determines the asymptotic velocities of explosively accelerated flat plates when the geometry is substantially one-dimensional. The computer program makes use of a standard finite difference code to approximate the three conservation equations of one-dimensional fluid dynamics. The computer code utilizes the best available approximation to the equation of state of Composition B and has a 4-parameter equation of state which is suitable for most inert materials. The program is believed to be sufficiently general to handle the majority of one-dimensional problems relevant to the multi-layer fragment warhead program. (Author)

AD-432 154 Div. 22, 10, 12
OTS price $9.60

IIT Research Inst., Chicago, Ill.
VULNERABILITY OF NUCLEAR WEAPON SYSTEMS TO FIRE - STUDIES OF BURNING EXPLOSIVES.
Final rept. 15 June 59-30 Nov 62
by Lester McChristian. Dec 63, 120p.
Contract AF29 601 1959, Proj. 8809
RTD DASA TDR63 3086; 1417
Unclassified report

Descriptors: (*Explosive materials, Combustion), (*Nuclear weapons, Safety), (*Combustion, Explosive materials), HMX, RDX, TNT, Vulnerability, Fires, Heat transfer, Combustion chamber, Burning rate, Pressure, High pressure research, Thermal conductivity, Thermal radiation, Mathematical analysis, Enthalpy, Thermodynamics, Test equipment.

This report covers analytical and experimental studies of the behavior of burning Composition B and PBX 9404 under various degrees of confinement. These studies were undertaken to determine the properties of the gas, the conductive heat transfer to the explosive, the radiant heat transfer to the surfaces of the high-explosive and chamber, and the heat evolved by the burning of the explosive. The work resulted in a theory which describes the burning of the explosives under unconfined and confined conditions, and the ensuing pressure buildup during the period the explosive remains intact and the reaction is limited to its surface. The results are in good agreement with experimental measurements of pressure, gas temperature, chamber temperature, and heat flux to meters in the gas stream. Beyond a pressure of about 1000 psia, the samples of Composition B cracked causing an abrupt increase in the rate of pressure rise. The cause of these phenomena and the question of whether or not PBX 9404 cracks were not resolved. The results of this work may be used to predict the minimum order of explosion which may arise from a system that is exposed to heating. (Author)

AD-432 252 Div. 22, 7
OTS price $5.60

Laboratories for Research and Development Franklin Inst., Philadelphia, Pa.
HERO COMPONENT TESTING HANDBOOK,

by Norman P. Faunce. 30 Sep 63, 58p. Rept. no. LM B1980 2
Contract N178 8102
Unclassified report

Descriptors: (*Handbooks, Test methods), (*Test methods, Electric detonators), Electromagnetic waves, Hazards, Radiation hazards, Sensitivity, Calibration, Electric potential, Test equipment, Attenuation, Explosives initiators, Radiofrequency.

AD-432 260 Div. 22
OTS price $2.60

Remington Arms Co., Inc., Bridgeport, Conn.
DEVELOPMENT OF EXPLOSIVES AND INITIATORS FOR SPECIAL WARFARE OPERATIONS.
Final summary rept., 19 Apr-19 Nov 63,
by T. B. Johnson. 19 Nov 63, 26p. Rept. no. AB64 1
Contract DA19 020AMC0115A, Proj. 5561 12 468 02
Unclassified report

Descriptors: (*Explosive materials, Nitrates), (*Explosives initiators, High-explosive ammunition), Detonations, Ammonium compounds, Phenols, Fuzes (Ordnance), Boosters, Fulminates, Mercury compounds, Fragmentation, Lead compounds, Monoxides, Processing, Handling, Detonators.

The feasibility of making a completely improvised demolition explosive package has been demonstrated. The optimum demolition charge consists of: (1) Fuse made from cotton string, glue, picric acid and litharge; (2) Detonator made from a fired cartridge case containing an initiating explosive made from picric acid and litharge, and plugged with beeswax; (3) Booster of picric acid in a short length of capped iron pipe; (4) Main explosive charge of a mixture of ammonium nitrate and used motor oil in a suitable size can. It is believed that these explosives and devices can be made by relatively unskilled personnel with readily obtained materials from indigenous sources such as drugstores, chemical plants, farm material supply houses and laboratories. (Author)

AD-432 282 Div. 22, 17
OTS price $5.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
CREEP AND CARRYING CAPACITY OF SHELLS,
by I. I. Holdenblat and N. A. Nikolayenko.
7 Feb 64, 58p.
RSIC 132
Unclassified report

Trans. from Nauchnoye Soobshchenye, Akademiya Stroityelstva i Arkhitektury SSSR, No. 13, pp. 1 - 60, 1960.

Descriptors: (*Projectiles, Creep), Plasticity, Temperature, Viscoelasticity, Elasticity, Deformation, Stresses, Theory, Mathematical analysis, Equations, Differential equations.

In this report certain problems are considered in the theory of the creep and carrying capacity of shells being plastically deformed (strained). The first chapter contains the general theory of the carrying capacity and creep of shells in the presence of strong high-temperature gradients. In it equations are given of equilibrium in a tensor form for shells made of isotropic and anisotropic viscous relaxing and herditary materials. The second chapter contains problems in the calculation of shells on the basis of a momentless theory, assuming that the material of the shell is subordinate to the linear law of the deformation of an elastic-viscous body, a medium as conceived of by A.Yu. Ishlinskiy, and the Boltzmann-Walther elastic-hereditary theory at a constant temperature. The third chapter contains the same problems as in the second chapter, but on the basis of the general moment theory of shells. For the mediums considered in the second and third chapters, the solution of creep problems for shells reduces to their elastic solution, multiplied by a certain characteristic multiplier, dependent upon time. Considering possible applications, we give a full set of formulas referring to these problems. (Author)

AD-432 537 Div. 22
OTS price $3.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J
THE ANTICIPATORY EFFECT, A STUDY OF THE BURNING MECHANISM OF DELAY-RELAY COLUMNS,
by Martin Gilford, Burton Werbel, Garry Weingarten and Lindbergh Key. Mar 64, 31p.
Proj. 504 01 027
PA TR3047 Unclassified report

Descriptors: (*Delay elements (Explosives), Burning rate), (*Explosive materials, Burning rate), Powders, Boron, Barium compounds, Chromates, Potassium compounds, Perchlorates, Combustion.

A newly recognized phenomenon termed the anticipatory effect is reported and its probable mechanism discussed. This effect occurs upon the burning of delay columns pressed above typical relay and flash charges and is reflected, in some systems, by more than a 40% diminution of burning time when no thermally sensitive terminal charge is present. An important mechanism operative in propagative columnar burning of pressed delay composition is the passage of hot gasses through pores of the column. These gases, reaction products of the burning delay composition in the upper portions of the column, evidently precede the flame front of the column and have been shown to ignite a terminally loaded relay charge at times shorter than would have been expected were the flame front alone the initiating source for the terminal charge. This effect has practical significance as it relates to end item performance. In this investigation the anticipatory effect was characterized for columns in which various delay and terminal charge compositions were used. (Author)

AD-432 598 Div. 22
OTS price $3.60

Rohm and Haas Co., Huntsville, Ala.
AN ANALYSIS OF SOME ASPECTS OF THE WENOGRAD THERMAL STABILITY EXPERIMENT,
by Joseph D. Clem, Jr. and W. H. Groetzinger, III.
3 Mar 64, 31p. Rept. no. S44
Contract DA01 021ORD11878Z
Unclassified report

Descriptors: (*Explosive materials, Stability), (*Mathematical models, Stability), Heat of activation, Heat, Propellants.

An analysis was made of some aspects of the Wenograd experimental technique for investigating the thermal stability of explosives at high temperatures. A mathematical model of the experiment was formulated; the equations were solved numerically and investigated parametrically. Results indicated that first estimates of the activation energy and pre-exponential factor of the explosives can be obtained from analysis of the experimental data. (Author)

AD-432 683 Div. 22
OTS price $1.10

Army Infantry Board, Fort Benning, Ga.
CONFIRMATORY TEST OF 37-mm SPOTTER AMMUNITION.
18 Feb 64, 6p.
Proj. 8 3 3260 12C
Unclassified report

Descriptors: (*Spotting rounds, Performance (Engineering)), Spotting rifles, Cartridge cases, Hazards, Tests.

AD-432 814 Div. 22
OTS price $6.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
RELIABILITY AND WATERPROOFNESS EVALUATION AND LOW TEMPERATURE CONSTANT CURRENT SENSITIVITY INVESTIGATION OF THE M2 ELECTRIC SQUIB,
by Leonard Shainheit. Feb 64, 61p.
TR 3138 Unclassified report

An expanded version is available to U. S. Military Agencies only as AD-432 817L.

Descriptors: (*Explosive initiators, Performance (Engineering), Sensitivity, Moisture proofing, Low temperature research, Reliability, Electric detonators, Test, Statistical data, Explosive materials, Capacitors, Electrical properties, Resistance (Electrical), Time, Electric potential, Temperature, Experimental data, Test methods, Specifications.

The purpose of this report on the M2 Squib is to present some recent data. The data were collected as a result of three separate investigations: (1) sensitivity and waterproofness test; (2) to compare sensitivity of different manufactures recent products; (3) to determine the validity of the -65 F functioning test. (Author)

AD-433 194 Div. 22
OTS price $2.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
PENETRATION OF SHAPED CHARGES INTO FROZEN GROUND. PART II,
by Robert Benert. Nov 63, 22p.
CRREL TR130 Unclassified report

Descriptors: (*Shaped charges, Firing tests (Ordnance)), Aluminum, Copper, Steel, Conical bodies, Penetration, Experimental data, Extrusion, Thickness, Weight, Design, Materials, Machining, Freezing, Demolitions, Soils.

The effect of various parameters was studied to design a charge that would do the work of the U. S. Army M2A3 (15lb) shaped charges with as large a saving in weight as possible. During February and March 1957, shaped charges of special design with a 4 in. diameter and weighing from 2 1/2 to 3 1/2 lb were fired into frozen ground at Fort Churchill, Manitoba. Data were obtained on the effect of standoff, charge weight and cone material, thickness, and angle. Results of the testing showed that a hole 5 ft deep and 1.7 in. in diameter in frozen ground can be obtained with a shaped charge weighing 2.8 lb. Aluminum cones are superior to copper or steel cones. Machined aluminum cones give greater penetration than rotary extruded aluminum cones. A 75 degree cone angle gave the best results. A thickness of 0.2 in. for the cone meets the minimum weight requirements. Additional studies to get greater penetration were recommended on weight and shape of charge, fabrication of copper and steel cones, and the validity of the cube root scaling for shaped charges. (Author)

AD-433 209 Div. 22, 25
OTS price $7.60

Virginia Polytechnic Inst., Blacksburg.
THE RESPONSE OF A THIN HEMISPHERICAL SHELL TO THE INITIAL PRESSURE PULSE OF AN UNDERWATER EXPLOSION. PART II.
Final rept.,
by Daniel Frederick. 15 Feb 64, 78p.
Contract N189 181 56 489A X
Unclassified report

Descriptors: (*Hemispherical shells, Underwater explosions), Shock waves, Pressure, Mathematical analysis, Equations, Elasticity, Propagation, Vibration.

AD-433 280 Div. 22
OTS price $2.60

Army Frankford Arsenal, Philadelphia, Pa.
LABORATORY SIMULATION OF TRACER FUNCTIOING,
by T. A. Doris, Jr. and W. W. Cavell. Jan 64, 26p.
AFA R1704 Unclassified report

Descriptors: (*Tracers (Ordnance), Test methods), Performance (Engineering), Quality control, Storage, Stability, Test methods, Small arms ammunition, Impact shock, Statistical analysis, Firing tests (Ordnance), Igniters, Sensitivity, Simulation.

An increased severity test, based on the impact sensitivity of the igniter portion of tracer ammunition, was developed to determine the quality, on a lot basis, of tracer ammunition. A ball falling on a firing pin having a 0.015-inch diameter flat surface on the apex of a thirty degree cone, has been found to be optimum in effecting ignition. Statistical analysis similar to that used for evaluating impact sensitivity of percussion primers was applied to evaluate sensitivity results. Preliminary correlation was established between gun firing data and the impact sensitivity. (Author)

23. PERSONNEL AND TRAINING

AD-431 205 Div. 23, 30, 28
OTS price $4.00

Sylvania Electronic Systems, Needham, Mass.
THE UDOFT FLIGHT SIMULATION SYSTEM.
Summary rept., June 56-Dec 62.
Dec 63, 280p.
Contract AF33 657 7065, Proj. 6114, Task 611413
AMRL TDR63 133 Unclassified report

Report on Simulator Techniques for Aerospace Crew Training.

Descriptos: (*Flight simulators, Space flight), (*Digital computers, Training devices), (*Training devices, Digital computers), Input-output devices, Mathematical models, Simulation, Control systems, Vocabulary, Analog systems, Magnetic tape, Computer storage devices, Design, Operation, Human engineering, Circuits, Computer logic.

UDOFT (Universal Digital Operational Flight Trainer) represents the first full-scale application of a high-speed, general-purpose digital computer to the real-time flight simulation problem. Through the use of the stored program digital computer, simulation of different aircraft is accomplished by changing the computer program. This flexibility is the key to the realization of the full advantages of the digital control system, as compared to the conventional analog control system, in this application. Basically a high-speed, general-purpose digital computer, the UDOFT computer represents an advancement in the design of real-time control computers. With the use of dual, 4096-word, random-access, magnetic core memories, the basic instruction time for the UDOFT computer is five microseconds. To interface with the analog environment of a flight compartment, the UDOFT computer is equipped with a special-purpose, real-time input-output capability. Use of the computer in a simulation system demanded the preparation of programs for applying the computer to the solution of the mathematical model of the real-world system under consideration. (Author)

AD-431 215 Div. 23, 28
OTS price $2.60

Laboratory of Aviation Physiology and Medicine, Ohio State U., Columbus.
EFFECTS OF MODIFIED TASK FEEDBACK DURING TRAINING ON PERFORMANCE OF A SIMULATED ATTITUDE CONTROL TASK AFTER THIRTY DAYS.
Rept., Sep 62- Aug 63,
by Robert Buckhout, James C. Naylor and George E. Briggs. Dec 63, 28p.
Contract AF33 657 10081, Proj. 1710, Task 171003
AMRL TDR63 125 Unclassified report

Report on Training, Personnel and Psychological Stress Aspects of Bioastronautics.

Descriptors: (*Attitude control systems, Performance tests), (*Audiometry, Noise), (*Tracking, Performance tests), Training, Measurement, Effectiveness, Errors, Display systems, Tables, Analysis ofvariance, Vision, Job analysis, Fuel consumption, Control.

This study was to determine the effects of modificatins in task feedback during training on performance of a simulated attitude control task after a 30-day interval. The criterion task consisted of compensatory rate tracking in three dimensions by means of noisy meter displays and a conventional stick with a twist dimension added. In addition, the intensity of auditory noise present varied proporionately to tracking error in four steps. Equal numbers of subjects trained for 1 or 3 weeks with either noisy or non-noisy displays and under one of two degrees of auditory feedback specificity (magnitude of steps used to relate visual noise to error score). Subjects trained with visual noise showed better performance after 30 days despite the fact that subjects trained with a noise-free display performed significantly btter during training. The subjects trained for 3 weeks showed significantly better tracking performance on 30-day retention test than subjects who received only 1 week of training. (Author)

AD-431 222 Div. 23, 28
OTS price $.75

Laboratory of Aviation Physiology and Medicine, Ohio State U., Columbus.
LONG-TERM SKILL TRANSFER AND FEEDBACK CONDITIONS DURING TRAINING AND REHEARSAL.
Rept. for Sep 62-July 63,
by James C. Naylor, George E. Briggs and Robert Buckhout. Dec 63, 1v.
Contract AF33 657 10081, Proj. 1710, Task 171003
AMRL TDR63 136 Unclassified report

Report on Training, Personnel, and Psychological Stress Aspects of Bioastronautics.

Descriptors: (*Transfer of training, Audiometry), (*Audiometry, Feedback), Performance tests, Tracking, Noise, Measurement, Training, Errors, Job analysis, Analysis of variance, Fuel consumption, Control.

Eight groups of subjects performed a continuous tracking and procedural task under various conditions of auditory performance feedback during training (8 days) and rehearsal (3 days). Four degrees of auditory cueing were used during training by varying (in size) the stepwise relationship between intensity of noise and amount of tracking error in three amounts plus a control condition of random noise. Two rehearsal conditions were used to complete the factorial arrangement-feedback similar to training versus random feedback. Rehearsal occurred 14 days after the completion of training and a transfer test to the medium-noise condition was conducted 14 days following the last rehearsal session for all groups. Transfer performance was found to be significantly related to feedback specificity during training (medium specificity was inferior to either high or low specificity), while the rehearsal variable had no statistical effect on performance with any performance metric. (Author)

AD-431 739 Div. 23
OTS price $10.10

North American Aviation Inc., Columbus, Ohio.
FLIGHT SIMULATOR STUDY OF HUMAN PERFORMANCE DURING LOW-ALTITUDE, HIGH-SPEED FLIGHT.
Nov 63, 124p.
Contract DA44 177TC803, Proj. 1D131201D159
ATRECOM TR63 52 Unclassified report

Descriptors: (*Flight simulators, Performance tests), (*Flight, Simulation), Low altitude, Flight testing, Display systems, Analysis, Cockpits, Training, Errors, Navigation.

AD-431 852 Div. 23, 8, 18
OTS price $1.60

Lockheed Electronics Co., Plainfield, N. J.
THE CHECKOUT AND MAINTENANCE (CAM) TRAINER: III. MALFUNCTION SIMULATOR,
by Paul R. Richard, John L. Moss and Eugene R. Hall. Oct 63, 19p.
Contract AF33 616 7584, Proj. 1710, Task 171004
AMRL P62 Unclassified report

Report on Training, Personnel and Psychological Stress Aspects of Bioastronautics.

Descriptors: (*Maintenance, Training devices), (*Electronics, Maintenance equipment), (*Maintenance personnel, Performance tests), Circuits, Design, Radar, Errors.

This report describes the Malfunction Simulator incorporated into the Checkout and Maintenance (CAM) Trainer. The Malfunction Simulator supports use of the CAM Trainer for research on electronic troubleshooting. The report indicates the components of the Malfunction Simulator, its general design and operation, and general procedures for programming malfunctions into the AN/ASB-4 Radar System, which is a major component of the CAM Trainer. Schematics, block diagrams, and photographs are included. Basically, the Malfunction Simulator consists of two units: a malfunction insertion unit and a control rack. The malfunction insertion unit can be easily inserted in the circuit immediately before any of the many major components. By use of the control rack, the malfunction insertion unit can open any one of up to 30 wires leading to the component of the AN/ASB-4 system and producing the desired malfunction. (Author)

AD-432 020 Div. 23, 30, 28
OTS price $10.10

University of Southern Calif., Los Angeles.
COMPUTER PERSONNEL SELECTION AND CRITERION DEVELOPMENT: II. DESCRIPTION AND CLASSIFICATION OF COMPUTER PROGRAMMER AND ANALYST JOBS,
by Joseph W. Rigney. Dec 63, 124p. Technical rept. no. 37
Contract Nonr22822
Unclassified report

Descriptors: (*Computers, Personnel), (*Operators (Personnel), Computers), (*Operators (Personnel), Selection), Factor analysis, Classification, Job analysis, Standards, Personnel management, Tables, Military requirements.

This is a report on the first phase of a research program devoted to the problems of computer personnel selection and evaluation. The research was designed primarily with the Navy's requirements in mind. In this phase, the computer analyst/programmer job family was structured in terms of common task patterns. A list of 186 task statements that covered a broad spectrum of programming and analytical activities was given to 150 computer personnel from sixteen organizations. The personnel were drawn from the areas of scientific and engineering, business and logistics, and military systems work. They also provided representation of the system analyst, senior programmer, and programmer job levels. (Author)

AD-432 145 Div. 23, 28
OTS price $1.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
PERSONAL HISTORY CORRELATES OF PERFORMANCE AMONG MILITARY PERSONNEL IN SMALL ANTARCTIC STATIONS,
by Paul D. Nelson. Nov 63, 13p.
NMNRU 63 20; NAVMED MR005 12 2004
Unclassified report

Descriptors: (*Military personnel, History), (*Performance tests, Military personnel), Aging (Physiology), Social communications, Behavior, Personality, Standards, Measurement, Emotions, Psychometrics, Job analysis, Sociometrics.

Personal history data were evaluated in relation to performance criterion measures for sixty-four Navy personnel each of whom had spent one year at an Antarctic scientific station. The four criteria included an evaluation of the man's social compatibility, emotional composure, and task efforts. As in previous studies of Antarctic station personnel, age was significantly related to performance. In the present study it was particularly related, in a positive direction, to emotional composure. Associated with age, but not significantly related to the criteria as individual items, were years of experience, previous stressful duty assignments, and advancement in rate. A second set of results centered about the concept of personal activities of an avocational nature. Individuals who were relatively heavy readers, had several hobbies, were active in sports, and belonged to various clubs were considered to be active individuals. Such activity, particularly for self-oriented activity such as reading and hobbies, was negatively related to social compatibility. The third major find was that individuals with a past history of delinquent behavior tended to perform less well than those without such a history. (Author)

AD-432 151 Div. 23, 28
OTS price $1.10

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
ABSTRACTS OF PERSONNEL RESEARCH REPORTS: IV. 1963,
comp. by Jo Ann Elson. Dec 63, 8p.
Projs. 6755, 7717
PRL TDR63 22 Unclassified report

Descriptors: (*Reports, Aviation personnel), (*Abstracts, Aviation personnel), Effectiveness, Classification, Selection, Job analysis, Personnel management.

This volume includes abstracts of the 23 technical documentary reports issued by the 6570th Personnel Research Laboratory in 1963. They cover studies in selection, classification, and utilization of Air Force personnel; systematizing information flow in support of personnel planning; methods of describing, evaluating, and structuring Air Force jobs; and development of procedures for improving the quality of Air Force personnel. (Author)

AD-432 858 Div. 23, 32
OTS price $1.10

Tor Education Inc., Stamford, Conn.
LESSON WRITING FOR TEACHING VERBAL CHAINS: ORDER IN WHICH ELEMENTS ARE TAUGHT.
Final rept. summary of Individual Technical Reports.
by Charles W. Slack. 1964, 4p.
Contract Nonr3972 00
Unclassified report

Descriptors: (*Learning, Verbal behavior), (*Learning, Performance tests), Education, Decision making, Theory, Vocabulary, Programming (Computers), Memory.

Division 23 - PERSONNEL AND TRAINING

AD-433 165 Div. 23
OTS price $1.60

Federal Electric Corp., Paramus, N. J.
BACKGROUND AND SYNOPSIS OF THE CORRECTIVE MAINTENANCE BURDEN PREDICTION PROCEDURE.
31 Jan 64, 18p. Rept. no. 64 34
Contract NOnr3821 00

Unclassified report

Descriptors: (*Maintenance, Mathematical prediction), (*Personnel management, Maintenance personnel), (*Maintainability, Job analysis), Electronics, Naval personnel, Electronic equipment, Labor, Reliability (Electronics), Training, Time, Data processing systems.

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-431 292 Div. 24, 8, 26
OTS price $3.60

National Cash Register Co., Dayton, Ohio.
HIGH RESOLUTION RAPIDLY PROGRAMMABLE MASKING FOR FUNCTIONAL ELECTRONIC BLOCKS.
Interim engineering rept.,
by Mark Sobottke, Richard Cady and Clifford Kruer. Feb 64, 38p. Rept. no. 28 1I
Contract AF33 615 1158, Proj. 4159, Task 415906
Unclassified report

Descriptors: (*Molecular electronics, Photoengraving), (*Photoengraving, Molecular electronics), Metal plates, Photographic plates, Positioning devices (Machinery), Servomechanisms, Automation, Optical equipment, Cameras.

The objective of this program is to provide new low-cost programmable maskmaking of high resolution. A study and investigation phase, in progress, includes the areas of maskmaking requirements, positioning systems, and optical techniques. Target specifications and a general approach for an engineering model have been defined. (Author)

AD-431 495 Div. 24, 18
OTS price $12.50

Boeing Co., Seattle, Wash.
A STUDY OF PHOTOINTERPRETER PERFORMANCE IN CHANGE DISCRIMINATION,
by C. L. Klingberg, C. L. Kraft and C. L. Elworth.
Nov 63, 174p. Document no. D2 90550
Contract AF30 602 2698, Proj. 6244, Task 624402
RADC TR63 482 Unclassified report

Descriptors: (*Aerial photography, Photo interpretation), (*Photo interpretation, Display systems), Resolution, Photographic images, Motion, Surface targets, Pattern recognition, Target discrimination, Stereoscopic display systems, Photo interpretability, Target recognition, Effectiveness, Performance tests, Statistical analysis, Terrain, Rural areas, Urban areas.

Two methods of inspecting pairs of comparison photographs were studied: (1) side-by-side display; and (2) apparent-motion display, in which pictures in spatial registry were presented in temporal alternation. This second presentation method produces apparent motion, where a difference between the pictures exists, which aids in the rapid detection of objects that have changed. Both experienced and inexperienced interpreters were tested with aerial photography varing in scale, contrast, resolution, and terrain complexity. Under certain conditions the apparent-motion display method was found to enhance significantly interpreter performance in the change detection task. However, it became relatively less effective with poorer quality imagery or where these was a high percentage of irrelevant change. Under difficult conditions, neither display method was significantly better than the other. Although the applications of the apparent-motion technique are limited, the results of this study suggest the value of further efforts to define the extent of its usefulness. (Author)

AD-431 578 Div. 24
OTS price $2.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION M. A. MAURER MODEL 255 PORTABLE PROCESSOR,
by Albert C. Mathias and J. R. Burhams. Feb 64, 24p.
TAC TR63 62 Unclassified report

Descriptors: (*Photographic processors, Portable), Military requirements, Tests, Design, Effectiveness, Operation, Maintainability.

The Model 255 Portable 5in. Film Processor possesses several very useful features such as compactness, light weight, portability and time and temperature independence. However, disadvantages such as low gammas, high fog level densities, excessive down time between 500 linear feet loadings and inability to accept a full range of reconnaissance products limit its application in support of reconnaissance operations. (Author)

AD-431 886 Div. 24, 30
OTS price $9.60

Instrument Corp. of Florida, Melbourne.
AN ADVANCED REDUCTION AND CALIBRATION FOR PHOTOGRAMMETRIC CAMERAS.
Final rept.,
by Duane C. Brown. 10 Jan 64, 117p.
Proj. 5930, Task 593003
AFCRL 64 40 Unclassified report

Subcontract to Brown (D) Associates, Inc., Eau Gallie, Fla., Contract AF19 604 8493.

Descriptors: (*Ballistic cameras, Photogrammetry), (*Astronomical cameras, Photogrammetry), Calibration, Photographic plates, Photographic images, Position finding, Errors, Corrections, Stars, Satellites (Artificial), Optical tracking, Scientific satellites, Geodesics.

In order to fully exploit recent advances in photogrammetric technology it has been necessary to develop a comprehensive plate reduction appreciably more powerful than any hitherto employed. In addition to factors considered in previous plate reductions, an advanced reduction must treat with full physical and statistical rigour such factors as: random errors in catalogued stellar positions; atmospheric refraction (particularly at great zenith distances); higher-order symmetric radial distortion; tangential distortion and asymmetric radial distortion resulting from imperfectly centered optics; differential bias between measurements of different types of images; effective utilization of uncatalogued stars for photogrammetric control; introduction of a priori constraints on any of the parameters of the reduction. Such a reduction is developed in this paper and illustrations of its practical application are provided. Special attention is given to decentering distortion, a topic inadequately treated in the photogrammetric literature. (Author)

AD-432 485 Div. 24, 1
OTS price $1.10

Chicago Aerial Industries, Inc., Barrington, Ill.
NIGHT ILLUMINATION SYSTEM FOR THE RF-101.
Monthly progress rept. no. 8, 20 Jan-20 Feb 64,
by T. L. Thompson. 24 Feb 64, 3p.
Contract AF33 657 11511
Unclassified report

Descriptors: (*Jet fighters, Aerial photography), (*Night photography, Illumination), Feasibility studies, Alkaline cells, Corrections, Performance (Engineering), Flash lamps.

AD-433 123 Div. 24, 2, 30, 1
OTS price $1.60

Colorado State U., Fort Collins.
FEASIBILITY OF BALLOON TRAJECTORY ANALYSIS UTILIZING ANALYTICAL PHOTOGRAMMETRY,
by Robert V. Hayman and Jon A. Peterka. 15 Jul 63, 18p. Rept. no. TP45pII
Contract N189 188 55120A
NWRF 15 0364 091 Unclassified report

Descriptors: (*Meteorological balloons, Photogrammetry), Aerial cameras, Surface-to-air, Optical tracking, Position finding, Mathematical analysis, Data processing systems, Programming (Computers), Flight paths, wind, Meteorological parameters, Measurement, Feasibility studies.

A feasibility study was made to determine whether photogrammetric methods and equipment developed under the original contract could be used to study the trajectory of a ground-released balloon for some miles into the atmosphere. It is thought such data would be of high value in determining the detailed structure of wind shear phenomenon, as a function of altitude. The investigators were successful in photographing a 1200-gm. balloon and defining its space position to a precision of around 1 part in 3000, under working conditions. Complete trajectory data were not secured, due to the limitations of available equipment. This report discusses the equipment and procedures used and the problems encountered in attempting to secure balloon trajectory data. (Author)

AD-433 150 Div. 24, 18, 8, 6,
OTS price $9.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
INSTRUMENTATION FOR AERIAL PHOTOGRAPHIC EXPERIMENTS. PHASE I REPORT.
by Leonard Bogdan. July 61, 117p. Rept. no. VF1478P1
Contract AF33 616 7481, Proj. 0 70 6220, Task 62799
Unclassified report

Descriptors: (*Aerial reconnaissance, Space-to-surface), (*Photographic reconnaissance, Space-to-surface), Research program administration, Surface targets, Design, Reflections, Optical coatings, Spectrophotometers, Photometers, Solar radiation, Photoelectric cells (Semiconductors), Detectors, Illumination, Measurement, Atmosphere, Light, Attenuation, Polarization, Calibration, Sensitivity, Installation, Airborne, Optical equipment, Photomultipliers, Electronic equipment, Spacecraft.

Part one of this report discusses the design, development, operation, and calibration of the photographic targets and associated photometric equipment. To a degree, Part one has been written to serve the purpose of an equipment instruction manual. Operational instructions are summarized. Part two discusses the mechanical and optical design of an airborne spectrophotometer having characteristics applicable to the special circumstances of the contemplated Air Force high altitude photographic program and matched to the ground instrumentation. Although the airborne spectrophotometer was not constructed, various recognizable installation and alignment problems were dealt with during the design phase and are reported. (Author)

AD-433 177 Div. 24
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR SEMIAUTOMATIC SETTING OF AN EXPOSURE IN A CAMERA,
by A. P. Orlov. Feb 64, 7p.
FTD TT63 1003 Unclassified report

Trans. from Patent No. 122021 (Appl. Nr. 579688/26, pp. 1-3, 28 Jun 57).

Descriptors: (*Camera shutters, Operation), Automatic, Exposure meters, Photographic equipment, Gears, Instrumentation, Photoelectric effect, Acceptability, Reliability.

AD-433 187 Div. 24
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AUTOMATIC EXPOSURE CONTROL FOR CAMERAS,
by Erik Kahn and Werner Kahn. 10 Feb 64, 5p.
FTD TT63 1002 Unclassified report

Trans. from Patent no. 125134, Appl. no. 628388/26, pp. 1-2, 18 May 59.

Descriptors: (*Camera shutters, Automatic), (*Photoelectric shutters, Design), Photoelectric effect, Release mechanisms, Sensitivity, Effectiveness, Diaphragms (Mechanics), Friction, Construction, Operation, Motion picture cameras, Cameras.

AD-433 246 Div. 24, 4
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD OF OBTAINING HYPERSENSITIZED PHOTOGRAPHIC EMULSIONS,
by S. M. Solov'yev and N. M. Parfenova.
10 Feb 64, 3p.
FTD TT63 1006 Unclassified report

Trans. from Patent no. 118405, Appl. Nr. 367802, p1, 26 Mar 49.

Descriptors: (*Photographic emulsions, Sensitivity), Photo chemistry, Photographic chemicals.

25. PHYSICS

AD-431 203 Div. 25
OTS price $8.60

Raytheon Co., Waltham, Mass.
DEVELOPMENT OF AN ULTRA-HIGH TEMPERATURE PYROLYTIC GRAPHITE THERMOCOUPLE.
Final rept., 1 Jan-30 June 63,
by C. A. Klein, M. P. Lepie, W. D. Straub and S. M. Zalar. Jan 64, 93p.
Contract AF33 657 10332, Proj. 1390, Task 139005
ASD TDR63 844 Unclassified report

Descriptors: (*Thermocouples, High temperature research), (*Pyrolytic graphite, Thermocouples), Carbon alloys, Boron alloys, Thermoelectricity, Hall effect, Crystal lattice defects, Magnetostriction, Resistance (Electrical), Electron transistors.

Electrical and galvanomagnetic effects along the layer planes of three classes of pyrolytic graphites (heat-treated, as-deposited, and boron-doped) are investigated in the temperature range from 0 to 1000 C. It is shown that the simple two-band model with symmetrical upper and lower pi bands and zero-gap configuration provides an adequate description of the charge-transport mechanism. Carrier concentrations and mobilities substantiate previous conclusions derived from low-temperature work, and allow us to assess crystallite sizes on an independent basis. Theoretical evaluations of the Seebeck coefficient are performed in the framework of a formation presumed rigorous for semimetals. Critical information on the scattering parameter of pyrolytic graphite is thus deduced. Experimental Seebeck-coefficient results confirm the main features of the analysis, in particular the type reversal that occurs in turbostratic graphites at temperatures of about 500 C. Thermocouple-design feasibility studies reveal that PGB/PG systems are capable of operation at least up to 2800 C. (Author)

AD-431 229 Div. 25
OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
CRYOPUMPING OF NITROUS OXIDE,
by R. F. Brown. Feb 64, 28p.
Contract AF40 600 1000, Proj. SW2309, Task 895107
AEDC TDR63 267 Unclassified report

Descriptors: (*Fluid mechanics, Low-temperature research), (*Fluid flow, Low-pressure research), Fluid dynamic properties, Nitrogen compounds, Oxides, Carbon dioxide, Vacuum pumps, Transition temperature.

An experimental study of the pumping speed of N20 at 77 K is presented. It is shown that the pumping speed remains constant in the free-molecular flow region, increases in the lower transition region, and then declines very rapidly as the pressure is further increased. The rapid decline in pumping speed in the higher pressure region is caused by the combined effects of the noncondensable gas present in the system and thermal overloading of the cryosurface. However, the exact contribution of each has not been determined. (Author)

AD-431 243 Div. 25, 26
OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
CORRELATION OF LASER THRESHOLD WITH THE OPTICAL QUALITY OF RUBY,
by C. M. Kellington, M. Katzman and S. K. Poultney. Dec 63, 12p.
Task 1G6 22001A056 03
AEL RDL TR2408 Unclassified report

Descriptors: (*Lasers, Ruby), Crystal growth, Quality control, Measurement, Optical analysis, Manufacturing methods, Collimators, Performance (Engineering), Optical equipment.

Measurements of the threshold for laser action and of the optical quality of fabricated ruby are presented. The correlation between the two is displayed. (Author)

AD-431 268 Div. 25
OTS price $3.60

Arizona State U., Tempe.
OXIDE SEMICONDUCTOR MATERIALS AND DEVICE RESEARCH.
Quarterly progress rept., no. 8, 18 Aug-17 Nov 63,
by F. L. English, C. J. Kevane, J. J. Morrison, B. M. Warmkessel and H. B. Whitehurst.
17 Nov 63, 30p.
Contract DA36 039sc89151, Task 3A99 21 001 01
Unclassified report

Descriptors: (*Semiconductors, Titanium compounds), (*Diodes (Semiconductor), Titanium compounds), (*Titanium compounds, Semiconductors), Ceramic materials, Dioxides, Neutron activation, Chemical analysis, Reduction (Chemistry), Impurities, Crystal growth, Life expectancy, Rectifiers, High temperature research.

During the preparation of semiconducting ceramic rutile samples for precise determination of bulk and contact resistance values, a short-term variation in the total sample resistance was observed. Attempts were made to determine the extent of reduction that occurs in ceramic rutile when it is heated in a vacuum. Representative samples of ceramic rutile of the type used in preparation of rectifying diodes were subjected to neutron activation analysis. Of the sixty-nine elements which can be detected in this fashion, only As and V were observed besides the major constituent of Ti. Experiments were initiated to determine the feasibility of growing single crystals of rutile from highly purified TiO2. (Author)

AD-431 272 Div. 25, 4, 14
OTS price $1.10

Frick Chemical Lab., Princeton U., N. J.
MEASUREMENT OF RANDOM SCISSION BY STRESS RELAXATION,
by Arthur V. Tobolsky. Feb 64, 7p. Technical rept. no. RLT71
Contract Nonr185807, Proj. NR356 377
Unclassified report

Descriptors: (*Synthetic rubber, Chemical bonds), Degradation, Stresses, Recombination reactions, Rubber, Polymers, Soduim compounds, Sulfides, Chlorine compounds, Mathematical models, Halogenated hydrocarbons.

AD-431 282 Div. 25, 15
OTS price $2.60

Institute of Tech., U. of Minn., Minneapolis.
ATTENUATION OF PLANE WAVES IN A SEMI-INFINITE COMPOSITE BAR,
by R. Plunkett and C. H. Wu. 24 Feb 64, 29p.
Contract NObs86783
Unclassified report

Report on Response of Large Elastic Bodies to Vibratory Forces on Small Areas.

Descriptors: (*Metal plates, Deformation), (*Mathematical models, Viscoelasticity), Compressive properties, Shear stresses, Bonding, Materials, Viscosity, Operators (Mathematics), Attenuation, Curve fitting, Wave transmission, Vibration, Steel, Perturbation theory, Damping, Loading (Mechanics).

AD-431 297 Div. 25, 17
OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
FORCED MOTION OF A PLATE,
by J. P. Jones. 28 Jan 64, 42p. Rept. no. TDR169 3153 10TN2
Contract AF04 695 169
BSD TDR63 110 Unclassified report

Descriptors: (*Surfaces, Elastic shells), (*Sheets, Shear stresses), Coatings, Structures, Fourier analysis, Integral transforms, Motion, Deformation, Propagation, Elasticity, Theory, Thickness.

In many cases of interest to experimentalists and geophysicists, the situation exists where a light, thin layer of material such as glue or adhesive is bonded to a heavier structure. If the layer is thin enough and it its acoustic impedance is small compared to the underlying structure, then the layer can be thought of as having little effect upon the motion of the substructure. Thus, the effect of the substructure is to force motion of the thin layer. The dynamic problem is considered of a thin layer forced by displacements on the lower face and tractions upon the upper face. The exact solution is derived for the two-dimensional case while the three-dimensional case is first considered using Bernoulli-Euler-Kirchhoff plate theory and, after this, including the effects of shear deformation and rotatory inertia. It is found that if shear deformation and rotatory inertia are included, the theory is fairly accurate for problems in which the quarter wavelength of the disturbance is greater than or equal to the plate thickness. (Author)

AD-431 300 Div. 25, 14
OTS price $.75

Naval Research Lab., Washington, D. C.
OPTICAL TESTS ON SOME RUBY SAMPLES.
by J. N. Bradford, R. C. Eckardt and J. W. Tucker. 6 Mar 64, 25p.
ARPA Order 306 62
NRL 6080 Unclassified report

Descriptors: (*Ruby, Optical analysis), (*Optical properties, Tests), Photographic analysis, Microscopy, Spark shadowgraph photography, Refractive index, Polarization, Scattering, Symmetry (Crystallography), Electric arcs, Zirconium, Lasers, Materials.

Six samples of ruby crystals grown by the Linde Company, Thermal Syndicate, Ltd., and Airtron have been subjected to several optical tests. The four types of tests performed are based on optic axis figure, shadowgraphs, examination between crossed polarizers, and small-angle scattering. The test results are presented primarily in photographic form. Optic axis figures were reasonably good in all but one of the samples examined. The shadowgraphs show striae in all of the samples and in some, wedges resulting from relatively uniform refractive-index gradients. One sample shows no small-angle scattering. In the other samples small-angle scattering is quite variable and strongly dependent on direction of transmission through the crystals. Examination between crossed polarizers provided no additional information. (Author)

AD-431 313 Div. 25, 4
OTS price $2.25

Manufacturing Labs., Inc., Cambridge, Mass.
THERMODYNAMICS OF INTERSTITIAL SOLID SOLUTIONS AND REFRACTORY COMPOUNDS.
Rept. for Sep 62-Sep 63,
by Larry Kaufman, Harold Bernstein and Ann Sarney. Nov 63, 96p.
Contract AF33 657 9826, Proj. 7350, Task 735001
ASD TR61 445, pt. 3 Unclassified report

Report on Refractory, Inorganic Non-Metallic Materials.

Descriptors: (*Solid solutions, Thermodynamics), (*Oxides, Thermodynamics), (*Carbides, Thermodynamics), (*Nitrides, Thermodynamics), (*Refractory materials, Chemical compounds), (*Thermodynamics, Solid solutions), Phase studies, Hafnium compounds, Zirconium compounds, Titanium compounds, Niobium compounds, Tantalum compounds, Enthalpy, Crystal lattice defects, Entropy, Vapor pressure, High-temperature research, Heat of formation, Energy, X-ray absorption analysis, X-ray diffraction analysis, Vaporization.

The thermodynamics of interstitial solid solutions and non-stoichio-metric compounds have been applied to analyses of the Ti-C, Zr-C, Hf-C, Nb-C, Ta-C, Ti-O, Zr-O, Ti-N, and Zr-N systems. The thermodynamic framework, based on the Schottky-Wagner model for non-stoichiometric phases has been applied to predict phase equilibria and vaporization data for these systems. Comparison with experimental thermodynamic, vapor pressure, and equilibria data available in the literature is very satisfactory. In addition, correlation between thermodynamic properties and vacancy concentration data where possible yields good agreement. (Author)

AD-431 314 Div. 25
OTS price $2.25

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
A PROBE FOR THE INSTANTANEOUS MEASUREMENT OF SURFACE TEMPERATURE.
Final rept., 11 June 62-31 July 63,
by Gerald A. Sterbutzel, John R. Shoemaker, Robert C. MacArthur, Henry M. Korytkowski and W. R. Brown. Jan 64, 94p.
Contract AF33 657 8745, Proj. 1347, Task 134702
RTD TDR63 4015 Unclassified report

Descriptors: (*Surface temperatures, Measurement), (*Temperature sensitive elements, Design), Thermocouples, Performance tests, High temperature research, Instrumentation, Manufacturing methods.

This report describes the design, development and evaluation of a probe system with which instantaneous temperatures can be measured on a variety of surfaces heated by radiation. It discusses a 1000 F system, its methods of operation and its performance characteristics. It shows that the 1000 F probe operates on a variety of materials with an accuracy generally better than 3/8% and with a time constant of the order of 0.1 seconds. A comparison of the performance of permanent surface thermocouple installations using iron-constantan, chromel-constantan and chromel-alumel thermocouples,

various thermocouple wire sizes, orientations, rates of heating and surface materials was made with the 1000 F probe performance. In almost every case, the accuracy of the probe was better than the accuracy of permanent surface thermocouple installation. The design of a probe system believed to be feasible for extending the range of operation to 3000 F is presented. The report also includes detailed information on the development of the sensor, fabrication of a probe, and a discussion of thermocouple attachment methods to non-metallic surfaces. (Author)

AD-431 547 Div. 25
OTS price $10.10

Royal Inst., of Tech. (Sweden.).
INTERACTION BETWEEN MICROWAVES AND PLASMAS IN GAS DISCHARGES AND SEMICONDUCTORS,
by B. Agdur. 31 Jan 64, 28p.
Contract AF61 052 552
RADC TDR64 93 Unclassified report

Descriptors: (*Plasma medium, Microwaves), (*Gas discharges, Plasma medium), (*Semiconductors, Microwaves), Propagation, Noise (Radio), Low-pressure research, Amplifiers, Waveguides, Excitation, Density, Electrons, Temperature.

Theoretical and experimental investigation were made of 1) microwave propagation in gas discharge and semiconductor plasmas; 2) noise radiaton from a low-pressure plasma; 3) variations of plasma properties along the positive column of a low-pressure Hg discharge. (Author)

AD-431 567 Div. 25
OTS price $.75

Air Force Avionics Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
ANALYSIS OF GENERALIZED OPTICAL ARRAYS,
by Edwin B. Champagne. Dec 63, 30p.
Proj. 5237, Task 523703
RTD TDR63 4138 Unclassified report

Report on Aerospace Radiation Weapons.

Descriptors: (*Lasers, Mosaics). (*Aerial reconnaissance, Lasers). Tolerances (Mechanics). Antenna configurations, Antennas, Optical equipment, Intensity, Statistical analysis, Polarization, Integral transforms, Degradation, Mathematical prediction, Statistical functions, Multiplication factor, Bandwidth, Phase distortion.

The extension of present microwave array theory to arrays of optical sources is studied. Statistical theory is applied to a generalized array in an attempt to predict what degradation of array factors may be anticipated for such factors as amplitude deviations, various polarizations, frequency bandwidths, phase deviations, and mechanical alignment errors. (Author)

AD-431 601 Div. 25, 8
OTS price $4.60

Bell Telephone Labs., Inc., Murray Hill, N. J.
CW SOLID-STATE OPTICAL MASER (LASER).
Final rept., 15 July 62-15 July 63.
15 July 63, 44p.
Contract DA36 039sc89068, Proj. 3A99 21 001
Unclassified report

Descriptors: (*Lasers, Solid state physics), Diffraction, Ruby, Dielectric properties, Diffraction analysis, Oscillators, Energy, Propagation, Fluorescence, Line spectrum, Rare earths, Garnet, Atomic energy levels, Yttrium, Aluminum, Potassium compounds, Tantalum compounds.

Work has proceeded on several distinct topics as follows: (1) High gain traveling-wave optical amplifier, (2) Pumping-light energy distribution in ruby rods, (3) Ruby oscillation linewidth, (4) Investigations of rare-earth spectra in yttrium aliminum garnets, (5) Nonlinear dielectric properties of KTaO3 near its Curie point, (6) The diffraction-limited oscillator. (Author)

AD-431 609 Div. 25, 8
OTS price $16.50

Gordon McKay Lab. of Applied Science, Harvard U., Cambridge, Mass.
STRESS EFFECTS ON INSULATOR TO METAL TRANSITIONS. I. V2O3, II. VANADIUM SPINELS,
by Julius Feinleib. 12 Dec 63, 255p. TR HP11
Contract Nonr1866 10, Proj. NR017 308
Unclassified report

Descriptors: (*Transition elements, Electrical properties), (*Semiconductors, Transition elements), (*Transport properties, Atomic orbitals), Vanadium compounds, Oxides, Spinels, High-pressure research, Cryogenics, Stresses, Transition temperature, Instrumentation, Resistance (Electrical), Single crystals, X-ray diffraction analysis, Crystal structure, High-temperature research, Anomalies, Thermodynamics, Spin, Electrons, Crystal lattices, Entropy.

Transport in the transition metal oxides remains as a gap in our knowledge of solids because of the difficulty of explaining the insulating behavior of substances which would appear, from more conventional theories, to have partly filled energy bands. Several theories have attributed the insulating behavior to the weak interaction of d electrons localized on the metal ions. It has been proposed that this interaction could be increased by decreasing the interatomic separation and thus cause the transport behavior to change from localized to band type. V2O3 exhibits a metal to insulator transition, and we have investigated the effects of stress on the conductivity and transition temperature to examine the prediction of these theories. (Author)

AD-431 629 Div. 25
OTS price $6.60

Institute of Engineering Research, U. of Calif., Berkeley.
MODES OF OPERATION OF CONFINED KW D. C. ARGON JETS IN HELIUM OR ARGON,
by R. M. Mchale. 30 Jan 64, 61p. Rept. no. AS64 2
Contracts AF49 638 502, Nonr222 45
Unclassified report

Descriptors: (*Jets, Argon), (*Helium), Direct current, Plasma medium, Measurements, Experimental data, Thermodynamics, Errors, Analysis, Magnetic fields, Equations, Wind tunnels, Plasma physics.

AD-431 635 Div. 25, 9
OTS price $5.60

Mount Auburn Research Associates, Inc., Cambridge, Mass.
COUPLING OF MAGNETOHYDRODYNAMIC TO ELECTROMAGNETIC AND ACOUSTIC WAVES AT A PLASMA-NEUTRAL GAS INTERFACE.
by S. L. Kahalas and D. A. McNeill. 31 Oct 63, 54p. Scientific rept. no. 1
Contract AF19 628 2836, Proj. 5633, Task 563307
AFCRL 63 944 Unclassified report

Descriptors: (*Magnetohydrodynamics, Acoustics properties), (*Electromagnetic waves,

Plasma medium), (*Ionospheric propagation, Extremely low frequency), Gas ionization, Mathematical models, Sound, Ionspheric disturbances, Electric fields, Polarization, Magnetic fields, Velocity, Electrical conductance, Fluid flow, Equations, Detectors.

The coupling of magnetohydrodynamic waves to electromagnetic and sound waves at a plane interface between a plasma and a neutral gas is considered for arbirtary direction of the incident wave vector and for the constant external magnetic field lying either in the plane of incidence or perpendicular to it. The relations between the angle of incidence, reflection, and transmission, the ratio of the field amplitude transmitted or reflected to the corresponding amplitude incident, and the energy coupling coefficients are calculated. An incident fast magnetoacoustic mode generates a sound wave whose wave propagation vector makes and angle with the normal to the the boundary of the order of the sound speed to Alfven speed, when this ration is small. In this case, the energy coupling coefficient of sound to the fast magnetoacoustic mode is also of the order of this ratio. An incident slow magnetoacoustic mode generates a sound wave with energy coupling coefficient of the order of unity, and an electromagnetic wave with energy coupling coefficient of the order of the ratio, speed of sound to speed of light. (Author)

AD-431 640 Div. 25
OTS price $4.60

Avco Research Lab., Everett, Mass.
RADIANT ENERGY LOSS FROM A CESIUM-ARGON PLASMA TO AN INFINITE PLANE PARALLEL ENCLOSURE.
by Michael A. Lutz. Sep 63, 43p. Research rept. no. 175
Contract AF04 694 33
BSD TDR64 6 Unclassified report

Descriptors: (*Plasma medium, Energy), Argon, Cesium, Plasma physics, Integral equations, Spectroscopy, Absorption, Heat transfer, Alkali metals, Atoms, Density, Pressure, Temperature, Electrons.

An integral equation dependent on the spectral absorption coefficient is derived for the radiant energy flux to the wall of an infinite plane parallel enclosure. An approximate spectral absorption coefficient for any alkali metal vapor is found for both continuum and line radiation. Specific calculations are performed for a cesium-argon mixture with a cesium atom density of 10 to the 16th power cc, an argon pressure of 1 atmosphere, an argon temperature of 2000K, and electron temperatures of 2000 K, 2500 K, and 3000 K. The flux to the wall is then computed numerically for planes separated by 1 cm, 10 cm and 100 cm. Continuum, line, and total radiation losses are given for each of the nine cases treated. The magnitude of the results indicates that radiant energy losses are not to be neglected in practical calculations based on a two-temperature model. (Author)

AD-431 654 Div. 25
OTS price $4.60

Sperry Gyroscope Co., Great Neck, N. Y.
ELECTROMAGNETIC ANGULAR ROTATION SENSING.
Interim Engineering rept. no. 3, 16 Nov 63-15 Feb 64,
by W. Macek D. Davis, R. Salamon and G. White.
Feb 64, 42p. Rept. no. AB1108 0016 3
Contract AF33 657 11433, Task 442704
Unclassified report

Descriptors: (*Lasers, Design), (*Frequency, Measurement), Gyroscopes, Transmission lines, Electromagnetic fields, Stability, Optical equipment, Polarization, Helium, Neon, Mirrors, Lenses, Cavity resonators.

Faraday ring-laser biasing, without quarter-wave plates, is described. Beat frequencies up to 3000 cps have been obtained for fields of 500 gauss using both permanent magnets and electromagnets. For this bias, laser oscillation must occur in a quasi-elliptical mode achieved through Brewster-angle window misalignment. The 108-cm miniature ring laser has shown improved stability, permitting it to be held in the hand and turned and also to be operated on a gyro test table. The current status of this miniature ring and the 8-meter visible ring is described. A graphical technique for the analysis of laser resonator mode configurations has been developed at Sperry by Dr. S. A. Collins. The applications of this technique to ring laser design is presented. An analysis of frequency pulling and mode locking is given, based on the three basic ranges of ring-laser operation: rotation at high angular velocity, rotation at very low angular velocity, and varying rotation from high to lower and lower angular velocities. This work is based on a ring-laser model using a twin-line transmission cable in a closed-loop configuration. Equations are presented describing the linear, cold cavity ring operation in the three ranges. (Author)

AD-431 661 Div. 25, 20, 30, 8, 16
OTS price $19.75

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
(No title).
Quarterly progress rept. no. 72,
by H. J. Zimmermann and G. G. Harvey. 15 Jan 64, 329p.
Contract DA36 039sc78108, Grant SIG36 039 61G14
Unclassified report

Descriptors: (*Scientific research, Reports), Molecular beams, Microwave spectroscopy, Radio astronomy, Infrared spectroscopy, Solid state physics, Geophysics, Noise, Lasers, Electronic equipment, Nuclear magnetic resonance, X-ray diffraction analysis, X-ray spectroscopy, Enzymes, Acoustics, Plasma physics, Magnetohydrodynamics, Energy conversion, Communication theory, Artificial intelligence, Speech recognition, Language, Biophysics, Neurology, Networks, Synthesis, Computers, Circuits.

AD-431 699 Div. 25
OTS price $1.10

Queen's U., Belfast (Gt. Brit.).
CLASSICAL CALCULATIONS FOR IMPACT IONIZATION CROSS SECTIONS,
by S. S. Prasad and Kamini Prasad. 1963, 8p.
Contract N62558 3634
Unclassified report

Descriptors: (*Ionization potentials, Atomic energy levels), (*Nuclear cross sections, Ionization potentials), Electron bombardment, Atomic structure, Atomic orbitals, Mathematical analysis.

AD-431 713 Div. 25, 4
OTS price $1.60

Tufts U., Medford, Mass.
EFFECT OF THE INTERNAL FIELD ON VIRBRATIONAL BAND SHAPES AND INTENSITIES IN LIQUIDS,

by Karl H. Illinger. 15 Jan 64, 20p. Contribution no. 293
Contract Nonr494 19, Proj. NR014 240
Unclassified report

Descriptors: (*Liquids, Spectra (Infrared)), (*Raman spectroscopy, Liquids), Infrared spectroscopy, Line spectrum, Band spectrum, Intensity, Statistical functions, Vibration, Molecular properties, Refractive index.

An analysis is given of the effect of the frequency dependence of the internal field upon band shapes and intensities in infrared and Raman spectra of liquids. It is shown that band shape in the Raman case is independent of the form of an isotropic internal field, and herefore a reflection of molecular interaction alone, whereas both effects are operative in generating infrared band shapes. Numerical calculations of infrared band shapes in liquids are presented for the Lorentz and Buckingham internal field functions. (Author)

AD-431 724 Div. 25
OTS price $3.00

Research and Technology Div., Air Force Systems Command, Washington, D. C.
BRAGG ANGLES FOR SOME SOFT X-RAY EMISSION LINES USING KAP AND RbAP ANALYZING CRYSTALS,
by David W. Fischer. Feb 64, 200p.
Proj. 7360, Task 736005
RTD ML TDR64 2 Unclassified report

Descriptors: (*X-ray spectrum, Atoms), (*Crystals, X-ray spectroscopy), Potassium compounds, Rubidium compounds, Phthalates, Tables, X-rays, Emissivity.

A complete table of 2 theta values for soft X-ray emission lines using potassium acid phthalate (KAP) and rubidium acid phthalate (RbAP) analyzing crystals is presented. All the lines of the K, L, and M series from 1.5 to 25 angstroms are included. (Author)

AD-431 744 Div. 25, 17
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
THE EFFECT OF TEMPERATURE AND STRAIN RATE ON THE YIELD AND FLOW STRESSES IN NIOBIUM,
by H. Conrad and G. A. Stone. 27 Jan 64, 38p.
Rept. no. ATN64 9236 6
Unclassified report

Descriptors: (*Niobium, Mechanical properties), (*Low-temperature research, Niobium), Crystal structure, Cryogenics, Heat of activation, Deformation, Stresses, Tensile properties, Shear stresses.

The activation energy, the activation volume, and the frequency factor for the plastic deformation of niobium at low temperatures were determined from the effect of temperature and strain rate on the yield and flow stresses. The present results are in accord with, and give support to, the idea that thermally activated overcoming of the Peierls-Nabarro stress is rate-controlling during the deformation of the BCC metals at low temperatures. (Author)

AD-431 761 Div. 25
OTS price $9.10

Institute of Engineering Research, U. of Calif., Berkeley.
COMPUTATION AND MEASUREMENT OF HALL POTENTIALS AND FLOW FIELD PERTURBATIONS IN MAGNETOGASDYNAMIC FLOW OF AN AXISYMMETRIC FREE JET,
by David R. Otis. 10 Jan 64, 105p. Rept. no. AS64 1
Contracts AF49 638 502, Nonr22245
Unclassified report

Descriptors: (*Plasma jets, Magnetohydrodynamics), (*Magnetohydrodynamics, Plasma jets), (*Hall effect, Measurement), Gas ionization, Argon, Magnetic fields, Reynolds number, Electric fields, Equations, Perturbation theory, Heating.

The interaction was observed between a supersonic free jet of partially ionized argon and the magnetic field of a coil concentric with the jet. Nominal values of the parameters were: Mach number, 3; Reynolds number, 1000; magnetic Reynolds number, 0.2; magnetic interaction parameter, 1; and Hall parameter, 1. The jet was strongly channelled. Axial and radial electric fields were observed in the jet with a net rise in potential across the interaction. These observations were consistent with predictions based on the single fluid, macroscopic equations, and a simple slug flow model. The current equation was solved to second order in the Hall parameter giving a closed form expression for the Hall potential which agreed with the experiments for weak fields. Flow perturbations were calculated for Mach numbers of 3.11, 6.08 and 10.05 by applying the method of characteristics to the linearized equations for a non-viscous, compressible fluid, neglecting Hall currents. The calculations are in qualitative agreement with the experiments and show Joule heating to be the major factor in perturbing the flow at high Mach numbers. (Author)

AD-431 781 Div. 25, 15
OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN APPROXIMATE METHOD FOR THE CALCULATION OF SCALAR SCATTERING BY TWO-DIMENSION BODIES,
by A. D. MacGillivray and A. F. Smith. 9 Jan 64. 16p. Group rept. 1964 1
Contract AF19 628 500
ESD TDR64 13 Unclassified report

Descriptors: (*Mechanical waves, Scattering), (*Scattering, Numerical analysis), Cylindrical bodies, Boundary value problems, Bessel functions, Least squares method, Programming (Computers), Mathematical analysis, Wedges.

A method for approximating the solution of two-dimensional scalar scattering problems has been developed and tested. Results indicate that the technique, which involves the expansion of the field in terms of cylindrical wave functions, gives good results when wave length and body size are comparable. (Author)

AD-431 791 Div. 25
OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
AN EXTENSION OF PRESENT NUMERICAL SOLUTIONS FOR TRANSIENT-HEAT CONDUCTION.
Rept. Jul 62-Feb 63,
by W. Richard Compton. Feb 64, 26p.
NOTS TP336, NAVWEPS 8419
Unclassified report

Descriptors: (*Heat transfer, Difference equations), Thermodynamics, Thermal radiation, Partial differential equations, Differential equations, Numerical methods and procedures, Convection, Thermal conductivity.

A fourth-order technique for the numerical solution of transient heat-transfer equations involving conduction, convection, and radiation is presented. Approximating parabolas and Taylor

series expansions are methods that are employed to facilitate the use of fourth-order finite-difference equations and Runge-Kutta techniques. The properties of the solutions are derived by graphic comparison with a reference case: Laplace transform-step-function solution. (Author)

AD-431 800 Div. 25, 30, 32
OTS price $2.25

Defense Documentation Center, Alexandria, Va.
MASERS AND LASERS (SUPPLEMENT). A DDC REPORT BIBLIOGRAPHY.
Bibliography for Feb 62-Mar 64,
comp. by Merrill F. Aukland. Mar 64, 1v.
Unclassified report

Supplement to AD-271 100.

Descriptors: (*Lasers, Bibliographies), (*Masers, Abstracts), Irasers, Documentation, Plasma physics, Gases, Liquids, Solid state physics, Materials, Instrumentation, Optical properties, Optical equipment, Microwaves, Microwave equipment, Millimeter waves, Radiation weapons, Communication systems, Light communication systems, Welding, Biology, Surgery, Infrared optical materials, Ultraviolet optical materials, Radar, Interferometers, Measurement, Standards.

This supplement is an updating of the DDC report bibliography on Masers and Lasers. The first unlimited unclassified bibliography on this subject appeared under AD-271 100 approximately two years ago. Rapid advancement in this field has prompted this updating. The supplement has developed different subject breakdowns than that of the first edition. Since there are no duplicate entries, some entries have arbitrarily been placed in a single category. (Author)

AD-431 811 Div. 25
OTS price $1.10

George Washington Carver Foundation, Tuskegee Inst., Ala.
AN INVESTIGATION OF THE FLOWING MERCURY ELECTRODE.
Final rept.,
by Lawrence F. Koons. 1 Feb 64, 10p.
Grant DA ARO D31 124G88, Projs. 59901004 and 2691C
AROD 2691 2 Unclassified report

Descriptors: (*Polarographic analysis, Measurement), (*Electrodes, Mercury), Electric currents, Cadmium, Alternating current, Surface properties.

Studies of the current-voltage relationship, and of the effect of concentration of electrolyzable substances as well as of mercury flow rate on the limiting current were made on an analogue of the polarographic cell in which the dropping mercury electrode is replaced by an electrode which consists of mercury flowing through a channel in a Teflon block. The limiting current is directly proportional to the concentration of the reducible species and to the mercury flow rate. The precision of the results is poor, apparently as a result of irregular variations in the behavior of the electrode surface. Studies of the results obtained for various empirical modifications of the channel configuration indicate that it will be possible to improve the extent of reproducibility of the results. (Author)

AD-431 854 Div. 25
OTS price $13.00

Microwave Lab., Stanford U., Calif.
NUMERICAL CALCULATIONS RELATED TO THE RF PROPERTIES OF THE PLASMA SHEATH,
by J. M Pavkovich. Jan 64, 184p.
Contract AF33 616 8121, Proj. 7073, Task 7073 03
ARL 64 17 Unclassified report

Descriptors: (*Plasma sheath, Radio frequency), (*Numerical analysis, Plasma sheath), Plasma physis, Dielectric properties, Theory, Equations, Analysis, Plasma medium, Electrical impedance, Distributions, Velocity.

In many considerations of the rf properties of a finite plasma, the plasma is treated as a dielectric and the boundary conditions associated with an ordinary dielectric are applied. Although this approach works well at times, it is by no means a satisfactory approach to understanding the rf properties of the boundary. In this paper, a detailed rf theory of the sheath is presented. The complete collisionless Boltzmann equation is used to derive a linear integral equation for the rf electric field through the sheath. The analysis is one-dimensional. This integral equation is solved numerically for a semi-infinite uniform plasma bounded by a sheath defined by a parabolic dc potential. A Maxwellian distribution of velocities is assumed for all computations. The results show that it is reasonable to assume that the normal component of displacement is continuous but that extra waves are set up near the boundary which decay as one moves into the uniform plasma. These waves are somewhat like the cutoff waves excited in the neighborhood of a waveguide discontinuity and thus give rise to a sheath impedance. A pressure type theory is also presented. This theory is based on moments of the collisionless Boltzmann equation. The results do not agree very well with results of the more exact theory and thus it is concluded that this type of theory is rather unreliable. (Author)

AD-431 855 Div. 25
OTS price $2.60

Stanford U., Calif.
RF BEHAVIOR OF THE PLASMA SHEATH.
Interim technical rept,
by J. Pavkovich and G. S. Kino. Jan 64, 22p.
Contract AF33 616 8121, Proj. 7073, Task 707303
ARL 64 15 Unclassified report

Report on research on plasma dynamics.

Descriptors: (*Plasma sheath, Numerical analysis), (*Radiofrequency, Electric fields), Theory, Plasma oscillations, Discharge tubes, Electrical impedance, Propagation, Fourier analysis, Integral transforms.

A theoretical treatment for the variation of rf fields within the sheath is given. The analysis is based on an integration of the collisionless Boltzmann equation, assuming that the static potential varies parabolically in the sheath. An effective impedance for the sheath can be defined, and that over the range in which the numerical results have been calculated, this impedance always has a real positive part. The real part of this impedance is associated with Landau damping. A set of curves is given of the field through the sheath. (Author)

AD-431 859 Div. 25
OTS price $1.60

Microwave Lab., Stanford U., Calif.
TRANSVERSE FIELD INTERACTIONS OF A BEAM AND PLASMA,
by G. S. Kino and R. Gerchberg. Jan 64, 19p
Contract AF33 616 8121, Proj. 7073, Task 7073 03
ARL 64 16 Unclassified report

Descriptors: (*Plasma medium, Electron beams), Radiofrequency, Cyclotron waves, Direct current, Magnetic fields, Charged particles, Electric fields, Electric arcs, Alternating current, Electron density, Theory, Motion, Velocity.

A new type of beam plasma interaction is described in which the basic rf motion is transverse to the dc velocity of the beam. It is shown that instabilities should occur near the electron plasma frequency. In the presence of a magnetic field further instabilities occur near the ion plasma frequency. An experiment has been performed to check the theory using an ion focused beam without magnetic field. As much as 25 db gain was observed in a 10 cm length at 450 Mc/s. (Author)

AD-431 860 Div. 25
OTS price $2.60

Microwave Lab., Stanford U., Calif.
EXACT SOLUTION OF THE COLLISIONLESS PLASMA-SHEATH EQUATION,
by S. A. Self. Jan 64, 30p.
Contract AF33 616 8121, Proj. 7073, Task 7073 03
ARL 64 13 Unclassified report

Descriptors: (*Plasma sheath, Equations), Low-pressure research, Ions, Space charges, Electron density, Velocity, Ionization potentials, Mercury, Hydrogen, Series.

The plasma-sheath problem for the low-pressure discharge in plane geometry is treated exactly, that is, with no arbitrary division into plasma and sheath regions. Numerical solutions are presented for various values of the parameter alpha, which is of the order of the ratio of the Debye length to the discharge width for 10 to the minus 3 power less than or equal to alpha less than or equal to 10 to the minus 1 power; and for three assumptions regarding the ion generation rate, namely generation uniform, proportional to electron density and proportional to the square of electron density. For the higher values of alpha, corresponding to weak laboratory discharges, there is a smooth transition from a quasi-neutral plasma region to a thick sheath. At the smaller values of alpha, the conventional model of a quasi-neutral plasma region passing rather abruptly into a narrow sheath region is substantiated. In all cases, accurate values for the potential profile throughout the plasma and sheath regions are given and compared with the separate asymptotic plasma and sheath solutions for alpha = 0. The ion current density, wall potential, space-charge density, mean ion energy, and sheath thickness are discussed. (Author)

AD-431 861 Div. 25
OTS price $2.60

Microwave Lab., Stanford U., Calif.
MEASUREMENT OF FIELDS IN THE PLASMA SHEATH BY AN ELECTRON BEAM PROBING TECHNIQUE,
by R. Harp and G. S. Kino. Jan 64, 23p.
Contract AF33 616 8121, Proj. 7073, Task 7073 03
ARL 64 14 Unclassified report

Descriptors: (*Plasma sheath, Metal plates), (*Electron beams, Probes (Electromagnetic)), Deflection, Measurement, Electric fields, Radiofrequency, Direct current, Electrodes, Recording systems, Magnetic fields, Deflection coils.

An experiment to measure both rf and dc fields in the sheath is described. The fields are determined by finding the deflection of an electron beam passed parallel to the sheath plasma interface. The sheath is which these experiments were done was formed in a low density plasma on a metal plate inserted into the plasma. Both the dc field variation and the rf field variation through the sheath when an rf potential was applied to the plate were measured. The dc field variation is in good agreement with a theory by Self. The measured rf field variations are in good agreement with a theory given by Pavkovich in an accompanying paper. No self-oscillations of any kind were measured in the sheath. This is thought to be due to a good Maxwellian distribution of electron velocities obtained by careful design of the discharge electrodes. (Author)

AD-431 887 Div. 25
OTS price $9.10

Radiation and Solid State Physics Lab., New York U., N. Y.
RESEARCH DIRECTED TOWARD THE STUDY OF PHOTOVOLTAIC EFFECTS IN ORGANIC AND INORGANIC CRYSTALS AND THIN FILMS.
Final rept.,
by H. Kallmann. Sep 63, 102p..
Contract AF19 604 5495, Proj. 6692, Task 66922
AFCRL 63 432 Unclassified report

Descriptors: (*Photoelectric effect, Crystals), Photochemistry, Photoelectric cells (Semiconductors), Photoconductivity, Electrodes; Organic compounds, Inorganic compounds, INnorganic polymers,

The conditions necessary for the production of various types of photovoltages are described. These are: photovoltages due to homogeneous or inhomogeneous excitation and subsequent production of free carriers in the photoconductor; photovoltages due to collisions of excitons with the electrode whereby the excitons are produced in the photoconductor but do not produce free carriers in this material; photovoltages due to chemical processes produced in the photoconductor or in the electrode material; photovoltages much larger than the band gap of the photoconductor. The theory of these photovoltages is given for various conditions. Finally the relationship between photovoltages and rectification is given. (Author)

AD-431 888 Div. 25, 15
OTS price $2.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
OBLIQUE INCIDENCE ON GENERAL MAGNETO-PLASMA SLAB,
by H. Unz. 15 Oct 63, 18p. SR21; Rept. no. 1116 36
Contract AF19 604 7270, Proj. 5633, Task 563307,
AFCRL 63 943 Unclassified report

Report on Investigation of a Theoretical Study of the Modification in Echo Area of Space Vehicles due to their Local Space Environment.

Descriptors: (*Electromagnetic waves, Propagation), Magnetohydrodynamics, Plasma physics, Polarization, Refractive index, Reflection, Wave transmission, Determinants, Boundary value problems, Aerospace craft, Spacecraft, Radar echo areas.

The problem of an arbitrary plane electromagnetic wave in free space, obliquely incident on a general magneto-plasma slab, is solved. The electromagnetic fields, inside and outside the plasma slab are evaluated in terms of determinants, and the reflection and the transmission coefficients are found. (Author)

Division 25 - PHYSICS

AD-431 895 Div. 25, 9
OTS price $1.60

AVCO Everett Research Lab., Everett, Mass.
EFFECT OF ELECTRODE NONUNIFORMITIES ALONG THE MAGNETIC FIELD IN MHD GENERATORS,
by Frank J. Fishman, Jr. Nov 63, 18p. RR 176
Contract AF04 694 414
BSD TDR63 248 Unclassified report

Descriptors: (*Magnetohydrodynamics, Generators), (*Electrodes, Magnetic fields), Plasma physics, Electrical conductance, Hall effect, Conformal mapping, Circuits, Integral transforms, Transport properties, Fluid flow, Electrical impedance.

The current distribution in an MHD channel with a working fluid characterized by a tensor electrical conductivity is computed for electrodes that are finely segmented in the flow direction but do not extend entirely across the channel. Fundamentally, this electrode geometry increases the normal internal impedance of the channel by an amount that is proportional to the aspect ratio of the channel, the quantity, and a factor that increases monotonically with the ratio of channel width to electrode width. The circuit characteristics as well as the efficiency characteristics of both normal current generators and Hall current generators based on this channel are worked out. The effects of electrodes segmented coarsely in the magnetic field direction, but finely along the flow, are deduced fromy the fundamental solution. A comparison with the effects of coarse segmentation along the flow indicates that these latter nonuniformities may be more than four times as effective in increasing the channel impedance. (Author)

AD-431 915 Div. 25, 13
OTS price $5.60

Pennsylvania State U., University Park.
SHOCK ANALYSIS OF STRUCTURAL NETWORKS,
by Vernon H. Neubert. Feb 64, 57p. Interim rept. no. 1
Contract Nonr65628X
Unclassified report

Descriptors: (*Beams (Structural), Shock (Mechanics)), (*Mechanical engineering, Shock (Mechanics)), Springs, Loading (Mechanics), Stresses, Structural properties, Damping, Mathematical models, Weight, Structures.

Two papers are presented which deal primarily with the effect of position of concentrated mass on response of components and systems. In the first paper the response of uniform clamped-free and hinged-hinged Bernoulli-Euler beams to step velocity ground shock is investigated. Weightless beams carrying concentrated masses are also analyzed to determine the best position for a minimum number of masses in order to match the uniform beam response at low frequencies. In the second paper, the mobility of a uniform bar is presented and compared with that of certain mass and spring systems. It is demonstrated that the mobility of the uniform bar can be matched to a limited extent by certain mass and spring combinations. In subsequent work, it is anticipated that the mobility or impedance behavior will be related to the shock response. (Author)

AD-431 920 Div. 25
OTS price $7.60

California U., Berkeley.
NUCLEAR MAGNETIC RESONANCE IN SUPERCONDUCTING VANADIUM FILMS,
by Richard Juul Noer. June 63, 78p.
Unclassified report
Doctoral thesis.

Descriptors: (*Vanadium, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Vanadium), Superconductivity, Transition temperature, Preparation, Relaxation time, Nuclear spins, Electron bombardment, Magnetic properties, Cryogenics, Theory.

Thin film NMR samples have been made of superconducting vanadium in pressures of less than 10 to the -6th power mm Hg, with thicknesses of 500, 200, and 100 A. After marked aging effects, these had normal state NMR linewidths typical of bulk V and superconducting linewidths consistent with calculated superconducting field exclusion. The transition temperatures were, respectively, 4.5, 3.6, and 2.8 K; a large fraction of the films in the 100 A sample did not superconduct. The spin lattice relaxation rate 1/T1 in the fully superconducting 200 A sample was proportional to the temperature to within 20% in both normal and superconducting states, and less than 4% change was seen in the metal NMR shift from normal to superconducting state at 0.4 Tc. Results on the 100 A sample were consistent with these. A discussion of susceptibility and nuclear shielding in metals shows that the formerly neglected orbital contribution is important in vanadium; it is estimated that the lack of any change in superconducting metal shift implies less than 9% change in that part of the total susceptibility due to the ordinary Pauli spin susceptibility. The behavior of T1 is attributed to the lack of an energy gap in these samples. (Author)

AD-431 925 Div. 25, 4
OTS price $1.60

Bausch and Lomb Inc., Rochester, N. Y.
STUDY OF NON-OXIDE MATERIALS WITH DEFECT STRUCTURES.
Semi-annual technical rept., 26 Oct 62-30 Apr 63,
by D. A. Buckner and N. J. Kreidl. 30 Apr 63, 19p.
Contract Nonr3632 00, Proj. NR015 501, ARPA Order 269
Unclassified report

Descriptors: (*Crystals, Fluorides), (*Fluorides, Crystal lattice defects), (*Crystal lattice defects, Fluorides), Nickel compounds, Magnesium compounds, Potassium compounds, Scandium compounds, Cadmium compounds, Bismuth compounds, Tellurides, Sodium compounds, Lanthanum compounds, Chalcogens, Crystal lattices, Crystal structure, Single crystals, High temperature research, Optical properties, Electrical properties, Preparation.

Continuation of survey studies included investigation of fluoride structures other than that of perovskite and chalcogenide phases. Complete solid solubility is indicated in the system NiF2-MgF2. Work began on the substitution of Ni(++) for Mg(++) in the KMgF3 perovskite structure. A broad compositional isothermal reaction survey in the system KMgF3-ScF3 has substantiated the existence of complex phase relationships and has led to a suspension of activity in that system. The chalcogenide compounds CdTe and Bi2Te3 were synthesized and efforts to establish solid solubility in that system are underway. Hot pressing of CaF2 constituted a first step in working with the half-breed derivatives of the fluorite structure e.g. CaF2-NaLaF4. (Author)

AD-431 928 Div. 25
OTS price $2.10

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
INFRARED OPTICAL MATERIALS WITH TRANSMISSION IN

THE 8-14 MICRON AND 1-10 MILLIMETER REGIONS.
Quarterly rept. no. 4, 1 Apr-30 June 63.
30 June 62, 21p.
Contract Nonr184188
Unclassified report

Descriptors: (*Infrared optical materials, Millimeter waves), Vacuum furnaces, Crystal growth, Fluorides, Calcium compounds, Barium compounds, Zone melting, Lead compounds, Halides, Dielectric properties, Thermal conductivity, Chlorides, Temperature, Single crystals, Symmetry (Crystallography).

AD-431 939 Div. 25
OTS price $1.60

Frick Chemical Lab., Princeton U., N. J.
A MOLECULAR THEORY FOR VISCOELASTIC BEHAVIOR OF AMORPHOUS POLYMERS,
by A. V. Tobolsky and J. J. Aklonis. Feb 64, 13p. Rept. no. RLT 72
Contract Nonr185807, Proj. NR356 377
Unclassified report

Descriptors: (*Polymers, Viscoelasticity), (*Viscoelasticity, Polymers), Alkenes, Relaxation time, Molecular rotation, Vibration, Mathematical analysis, Glass, Phase studies.

The relaxation modulus for N.B.S. polyisobutylene was interpreted as a sum of two Rouse functions each arising from a different molecular mechanism. One is associated with torsional vibrations and internal rotation. The other is associated with an entangled network of gaussian segments. Each Rouse function is characterized by three parameters, which can be obtained from the experimental relaxation modulus. (Author)

AD-431 940 Div. 25
OTS price $1.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
THE EFFECT OF QUADRUPOLE VIBRATIONS ON 1-FORBIDDEN M1 TRANSITIONS,
by Raymond A. Sorensen. 19 July 63, 12p. TR12
Contract Nonr76015, Proj. NR012 202
Unclassified report

Descriptors: (*Nuclear shell models, Quadrupole moments), Nuclear resonance, Phonons, Selection rules, Quantum mechanics, Nuclear energy levels, Mathematical analysis.

The effect of quadrupole vibrations on 1-forbidden M1 transitions is computed using the wave functions resulting from the shell model with a residual pairing plus P(2) force. These wave functions for low states of an odd nucleus are a linear combination of a spin j quasi-particle and spin j' quasi-particles coupled to 2+ phonons to angular momentum j. The one-phonon components of the wave functions allow 1-forbidden M1 transitions to proceed both via the single particle and collective M1 operators. The calculation shows that this quardrupole coupling can explain most of the observed transition rate in a number of cases, while in a few cases, particularly for the odd-N nuclei fast transitions occur which are still unexplained. In addition, it is shown that the E2 contribution to these transitions while expected to be enhanced to several times single particle in most cases, nevertheless usually makes only a very small contribution to the total rate. (Author)

AD-431 977 Div. 25, 4
OTS price $1.10

California Inst. of Tech., Pasadena.
NITROGEN-15 MAGNETIC RESONANCE SPECTROSCOPY. I. CHEMICAL SHIFTS,
by Joseph B. Lambert, Gerhard Binsch and John D. Roberts. Feb 64, 7p. Rept. no. TR30
Contract Nonr22026, Proj. NR005 388
Unclassified report

Descriptors: (*Nitrogen, Nuclear magnetic resonance), (*Isotopes, Nitrogen), (*Nuclear magnetic resonance, Isotopes), Nitrogen compounds, Organic nitrogen compounds, Molecular spectroscopy.

AD-431 985 Div. 25
OTS price $2.60

Keele U., (Gt. Brit.).
RESEARCH IN MOLECULAR QUANTUM THEORY.
Final technical rept. 1 Nov 62-31 Oct 63.
30 Nov 63, 30p.
Contract DA91 591EUC2736
Unclassified report

Descriptors: (*Electron transitions, Quantum mechanics), (*Quantum mechanics, Atomic orbitals), Molecular properties, Heterocyclic compounds, Functions, Nuclear spins, Spin.

AD-431 991 Div. 25
OTS price $2.60

General Electric Co., Schenectady, N. Y.
RESEARCH ON CdTe.
Quarterly progress rept. no. 11, 1 Nov 63-31 Jan 64,
by R. E. Halsted, D. T. F. Marple and B. Segall.
31 Jan 64, 24p.
Contract AF33 616 8264
Unclassified report

Descriptors: (*Cadmium alloys, Tellurium alloys), Absorption spectrum, Calibration, Fluorescence, Optical properties, Transport properties, Measurement, Phonous, Emissivity, Hall effect, Cyclotron resonance phenomena, Brillouin zones, Photons, Crystal lattice defects, Spectrophotometers, Energy.

AD-431 999 Div. 25
OTS price $1.60

University of Southern Calif., Los Angeles.
''ISOTOPE SHIFT AND HYPERFINE STRUCTURE'',
Final rept., 1 July 47-31 Aug 63,
by John R. Holmes. 31 Aug 63, 14p.
Contract Nonr2283, Nonr22814, Proj. NR019 110
Unclassified report

Descriptors: (*Hyperfine structure, Isotropism), Line spectrum, Atomic energy levels, Interferometers, Isotope separation, Nuclear moments.

AD-432 005 Div. 25
OTS price $16.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COSMIC RESEARCH (Kosmicheskiye Issledovaniya).
14 Feb 64, 249p.
FTD TT64 90 Unclassified report

Trans. from Izdatel'stvo Akademii Nauk SSSR, 1:3, pp. 339 - 480, 1963.

Descriptors: (*Cosmic rays, Symposia), Satellites (Artificial), Charged particles, Magnetic fields, Motion, Meteorological balloons, Moon, Aerodynamic characteristics, Terrestrial magnetism, Van Allen radiation belt, Statistical mechanics.

Contents: The Evolution of the Rotation of a Dynamically Symmetrical Satellite; On the

Adiabatic Invariants of Motion of a Charged Particle in a Stationary Heterogeneous Magnetic Field; On the Density Distribution and Intensity of Charged Particles Without Taking into Account Interaction in a Stationary Geomagnetic Field; Motion of Charged Particles in a Magnetic Dipole Field with Allowance for Dissipation of Energy; Investigations of Cosmic Radiation Beyond the Atmosphere; Outgoing Radiant Fluxes onto Variously Oriented Surfaces at a Height of 300 km; Balloon Investigations of the Radiation Balance of the Earth's Surface-Atmosphere System; The Value of Geographic-Geological Methods of Studying the Moon; and Main Structural Elements of the Moon.

AD-432 033 Div. 25, 8
OTS price $3.60

Raytheon Co., Waltham, Mass.
STUDY OF MICROWAVE GENERATION BY MEANS OF ELECTRON BEAM INTERACTION WITH ANISOTROPIC MEDIA.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 63,
by S. F. Paik and R. J. Briggs. 31 Dec 63, 40p.
Rept. no. S612
Contract DA36 039AMC02362E, Task 1G6 22001A055 04
Unclassified report

Descriptors: (*Electron beams, Anisotropy), (*Microwaves, Propagation), Design, Discharge tubes, Materials, Graphite, Probes (Electromagnetic), Microwave equipment, Generators, Plasma medium, Backward-wave oscillators.

The interaction between electron beams and anisotropic media is investigated as a possible means of generating microwave energy. Two particular anisotropic materials being considered for the present study are plasmas and pyrolytic graphite. In the two parts the interaction of an electron beam with an annular plasma column is considered. Experimental work to determine the modes of propagation in an annular plasma column is now under way. Experimental apparatus and difficulties encountered in the construction of the discharge tube are described in Part I. No significant rf experiment has been carried out. In Part II, the electron-beam interaction with modes other than axially symmetric mode which might give rise to unwanted ''spurious'' oscillations is investigated theoretically. In Part III, results of the experimental work on waves in anisotropic resistive material (Pyrographite) are presented. The particular circuit being considered is a modified Karp line. The presence of the Karp-line mode has been established, but the attenuation of the mode due to the high conductivity of the material in the axial direction is found to be too great to make this type of circuit practical. (Author)

AD-432 039 Div. 25, 15
OTS price $3.60

Uppsala U. (Sweden).
ANALYTIC PROPERTIES OF ONE-DIMENSIONAL BLOCK-FUNCTIONS,
by Gert Eilenberger. 15 Aug 63, 32p. Technical note no. 105
Contract AF61 052 351
ARL 64 38 Unclassified report

Descriptors: (*Potential theory, Differential equations), (*Quantum mechanics, Special functions (Mathematical)), Algebraic topology, Equations, Complex variables, Perturbation theory, Motion.

The analytic properties as functions of wave number k of the solutions of a single-electron Schrodinger equation for one-dimensional periodic potentials with inversion symmetry have been treated by Kohn for nonconnected energy bands. Kohns results are generalized in order to include the case of missing inversion symmetry and connected bands; already known results are reviewed to a certain extent in order to treat the generalizations in a closed frame. A simple proof is given, that the Schrodinger equation, considered as differential equation with initial conditions, has solutions which are holomorphic as functions of the parameter E throughout the whole complex E-plane even in the very singular cases when the potential contains δ-functions or infinities which are not too strong. The Floquet functions are then constructed in the usual way. The asymptotic behavior of the functions for large (E) is discussed in a detailed way and some remarks are made in the case of singular potentials. The inverse of the function E(k) is also considered. The structure of the Riemannian surface of E(k) is obtained. The Bloch functions are normalized without assuming inversion symmetry for the potential. Their analytic structure turns out to be somewhat more complicated than that of E(k). (Author)

AD-432 080 Div. 25
OTS price $19.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NONLINEAR OSCILLATIONS OF MECHANICAL STRUCTURAL ELEMENTS. (Nelineynyye Kolebaniya Elementov Mashin I Sooruzheniy),
by N. V. Grigor'yev. 10 Feb 64, 316p.
FTD TT62 1197 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Mashinostroitel'noy Literatury Moskva-Leningrad, pp. 1-255, 1961.

Descriptors: (*Oscillation, Nonlinear systems), (*Structures, Vibration), Textbooks, Load distribution, Turbine blades, Transmissions, Rotor blades (Turbomachinery), Design, Beams (Structural), Machines.

This book discusses nonlinear oscillations in beams, rotors, blades, and composite systems of the rotor-frame type. Critical processes in shafts with nonlinear supports are examined. Relationships are established between the functional conditions and vibration states of turbines. Methods based on the properties of the nonlinear oscillations of elastic systems are developed to help forestall critical operating conditions and transverse oscillations of machine elements. The book is designed for engineers and technicians working in the mechanical-engineering and structural-design specialties, and may also be used for students in upperclass courses at higher educational institutions. (Author)

AD-432 139 Div. 25, 8
OTS price $4.60

Microwave Associates Inc., Burlington, Mass.
INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS.
Quarterly progress rept. no. 2, 16 Feb-15 May 63,
by H. S. Maddix, J. Gregory and C. S. Ward.
15 May 63, 49p.
Contract DA36 039AMC00097E
Unclassified report

Descriptors: (*Gas discharges, Plasma medium), (*Helium group gases, Cleaning), (*Electronics, Gases), Plasma sheath, Absorption, Diffusion, Temperature, Quartz.

Cleanup and thermal recovery of inert gases at the interface between a high power microwave discharge and a quartz surface have been further investigated. Argon, krypton and helium appear to have comparable cleanup characteristics. Neon reveals the fastest cleanup rate and xenon does

not appear to cleanup in the long term. In all cases the number of atoms sorbed while the discharge was on was observed to be proportional to the square root of time. Rapid and complete recovery of the trapped gas is observed following cleanup at low ambient temperatures. Recovery following cleanup at high ambient temperatures is characterized by a much slower desorption which is linear with the square root of time. Analysis of the data indicates that cleanup and recovery are controlled by activated diffusion. (Author)

AD-432 140 Div. 25
OTS price $2.60

Alabama U., University.
STUDIES OF SOLIDS AT LOW TEMPERATURES.
Final technical rept.
8 Apr 63, 26p.
Grant AF AFOSR61 43
Unclassified report

Descriptors: (*Solids, Low-temperature research), (*Nuclear spins, Nuclear magnetic resonance), Quadrupole moments, Decoy schemes, Free radicals, Harmenic oscillators, Spectrum analyzers, Temperature, X-ray spectroscopy.

AD-432 142 Div. 25
OTS price $1.10

Columbia Radiation Lab., New York.
THE OPTICAL MASER APPLIED TO BRILLOUIN SCATTERING SPECTROSCOPY.
Progress rept. no. 2, 1 Apr-30 Sep 63,
by R. Novick. Sep 63, 4p.
Grant DA ARO D31 124G380, Proj. 009925001
Unclassified report

Descriptors: (*Lasers, Spectroscopy), Brillouin zones, Scattering, Light transmission, Phonous, Spectrum analyzers, Polymers, Biology.

AD-432 160 Div. 25, 17
OTS price $5.60

University of Southern Calif. Engineering Center, Los Angeles.
AN INVESTIGATION OF FACTORS INFLUENCING THE OUTGASSING RATE,
by Kenneth W. Rogers. 30 Sep 63, 51p. Rept. no. 77 101
Unclassified report

Descriptors: (*Gases, Diffusion), (*Materials, Stainless steel), Vacuum pumps, Molecular properties, Metals, Gas flow, Specific heat, Thermal conductivity, Water, Hydrogen, Nitrogen, Pressure, Temperature.

An analysis is made to determine the factors influencing the outgassing from a specimen exposed to a vacuum. Consideration is given to the effect of the specimen temperature and prior exposure to contaminating environments. It is shown that the complete history of the specimen must be considered when estimating the outgassing rate. Two experimental programs were made to determine the constituents of the outgassing of metals. It was found that the outgassing from stainless steel was primarily H2O, H2, and N2. (Author)

AD-432 170 Div. 25, 6
OTS price $5.60

Texas U., Austin.
RESEARCH ON PLASMA DIAGNOSTIC METHODS FOR HIGH TEMPERATURE PLASMA RESEARCH.
Interim technical rept.,
by Arwin A. Dougal. Jan 64, 54p.
Contract AF33 657 11073, Proj. 7073, Task 7073 01
ARL 64 6 Unclassified report

Report on Research on Plasma Dynamics.

Descriptors: (*Plasma physics, High temperature research), (*Lasers, Infrared radiation), (*Infrared detectors, Measurement), Blackbody radiation, Kerr cells, Irasers, Interferometers, Polarization, Bremsstrahlung, Calibration, Magnetic fields, Magneto-optic effect, Gas ionization, Electromagnetic waves, Gas discharges, Electrostatics, Photoconductivity.

Laboratory instrument development of a far infrared radiation detection system for plasma diagnostics is summarized. The detection capability of the indium-antimonide infrared detector which is now available for the 0.05 to 4 mm wavelength range is evaluated analytically. Bremsstrahlung emission from high temperature plasma for frequencies above the plasma frequency is evaluated. Black body radiation in a finite band at wavelengths from 0.6 to 4 mm is evaluated. The signal-to-noise ratio is found to be favorable for the higher emissions. Ion energy analysis of high temperature plasmas is useful to infer thermalization times, ion temperature, and quantities and types of impurities. The design and experimental arrangement of an electrostatic ion energy analyzer is presented. A Penning discharge source is planned to serve as a calibration source which is collimated with well-defined ion energies. (Author)

AD-432 181 Div. 25, 2
OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RESULTS OF CERTAIN HEAT-ENGINEERING INVESTIGATIONS,
by V. D. Yusufova. 10 Feb 64, 21p.
FTD TT63 922 Unclassified report

Trans. from Trudy Energeticheskogo Instituta. In-Ta An SSR. Izdatel'stvo An Azer SSR, no. 15, pp. 180-194, 1962.

Descriptors: (*Thermodynamics, Gases), (*Equations of state, Kinetic theory), Heat transfer, Hydrocarbons, Specific heat, Entropy, Enthalpy, Engineering, Heat exchangers, Combustion, Petroleum, Sand, Shale, Geology, Fuels.

AD-432 210 Div. 25
OTS price $12.00

National Bureau of Standards, Washington, D. C.
TABLES OF THERMODYNAMIC PROPERTIES OF NITROGEN IN CHEMICAL EQUILIBRIUM INCLUDING SECOND VIRIAL CORRECTIONS FROM 2000 K TO 15,000 K,
by Joseph Hilsenrath and Max Klein. Mar 64, 169p
AEDC TDR63 162 Unclassified report

Descriptors: (*Nitrogen, Thermodynamics), (*Thermodynamics, Nitrogen), (*High-temperature research, Chemical equilibrium), (*Tables, Thermodynamics), Gases, Gas ionization, Air, Equations of state, Enthalpy, Entropy, Density, Low-pressure research, High-pressure research, Chemical reactions, Compressive properties.

Tables for the thermodynamic properties for nitrogen are presented which take into account the effect of dissociation and ionization and the limiting-law Debye-Huckel and second virial corrections, upon the thermodynamic properties and the equilibrium compositions. Values are tabulated from 2000 K in steps of 100 K to 15,000 K at close spacings in the logarithm of the density (log rho/rho sub o = -7.0 (0.2)

2.4) for the compressibility factor Z = PV/RT; the dimensionless functions for: internal energy, E/RT; enthalpy, H/RT; entropy, S/R; log P(atm) and Z rho/rho sub o = sigma c sub i. The underlying equations and the input data are discussed briefly. The effects of the real gas corrections on the equilibrium properties are illustrated graphically. The equilibrium composition is given for selected temperatures over the tabulated density range. The wide range of temperatures and densities over which the thermodynamic properties have been tabulated make the tables useful in a variety of engineering design and test programs, and in scientific research and development. (Author)

AD-432 236 Div. 25
OTS price $1.60

California U., Los Angeles.
THEORY OF THE NUCLEAR SHELL MODEL.
Final rept., 18 Sep 60-17 Sep 63,
by S. A. Moszkowski. 17 Sep 63, 11p.
Grant DA ORD31 124 61G382
AROD 1784 31 Unclassified report

Descriptors: (*Nuclear shell models, Theory), Nuclear models, Nuclear structure, Quantum mechanics, Perturbation theory, Nuclear spins, Nuclear scattering.

AD-432 240 Div. 25, 15, 4
OTS price $1.10

Frick Chemical Lab., Princeton U., N. J.
CELL MODEL FOR DIFFUSE PHASE TRANSITION,
by Arthur V. Tobolsky. Mar 64, 6p. Rept. no. TR RLT73
Contract Nonr185807, Proj. NR356 377
Unclassified report

Descriptors: (*Mathematical models, Phase studies), (*Phase studies, Mathematical models), Matrix algebra, Functions, Diffusion, Theory, Crystal lattices.

AD-432 269 Div. 25, 17, 26
OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
THE APPLICATION ULTRASONICS TO WIRE DRAWING.
Quarterly progress rept. no. 3, 1 Oct-31 Dec 63,
by A. T. Robinson, J. C. Connelly, and L. M. Stayton. Feb 64, 11p.
NOTS TPR352; TP3463 Unclassified report

Descriptors: (*Ultrasonic radiation, Wire), (*Dies, Carbides), Tungsten compounds, Transducers, Design, Manufacturing methods, Metals.

New information has been obtained on the effect of ultrasonic radiation on metal wire drawing. Wire drawing operations have been significantly improved by design modification of die holder assembly and transducer-horn mounting. A major contribution was made by the development of an isolator positioned between die and draw chuck. Tungsten carbide dies have been adapted and considerable improvement has resulted in surface finish. (Author)

AD-432 295 Div. 25
OTS price $2.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
CRITICAL HEAT FLUXES DURING FLOW OF A WETTING LIQUID WITH A NUCLEUS, UNDERHEATED TO THE TEMPERATURE OF SATURATION,
by S. S. Kutateladze, tr. by Ingeborg V. Baker. 31 Jan 64, 21p.
RSIC 129 Unclassified report
Trans. from Energetika, No. 2, pp. 229-239, 1959.

Descriptors: (*Boiling, Coolants), (*Coolants, Heat transfer), Liquid cooled, Liquids, Hydrodynamics, Viscose, Fluid flow.

AD-432 314 Div. 25, 4, 30
OTS price $10.50

University Coll., London, (Gt. Brit.).
ONE-DIMENSIONAL X-RAY DIFFRACTION TECHNIQUES AS A ROUTINE STEREO-CHEMICAL TOOL.
Technical rept. no. 1 (Final), 1 Dec 62-30 Nov 63,
by R. S. Nyholm, Peter Pauling, G. B. Robertson and Jean Dollimore. 1 Dec 63, 133p.
Contract DA91 591EUC2775
Unclassified report

Descriptors: (*X-ray diffraction analysis, Test methods), (*Complex compounds, X-ray diffraction analysis), (*Programming (Computers), X-ray diffraction analysis), Crystal structure, Powders, Solutions, Liquids, Molecular structure, N-heterocyclic compounds, Nickel compounds, Titanium compounds, Arsenic compounds, Chlorides, Acetates, Aromatic compounds, Perchlorates, Cobalt compounds, Quinolines, Bromides, Potassium compounds, Platinum compounds, Ketones, Zirconium compounds, Digital computers, Crystals, Chromium compounds, Single crystals, Hydrates.

The objective of this investigation was to develop and evaluate techniques for obtaining information on the structure of molecules by use of one dimensional x-ray diffraction data from crystalline powders, solutions and liquids and to obtain such information on the structure of molecules, with particular reference to coordination compounds. Techniques for collecting easily and rapidly high quality one dimensional diffraction data and the numerical treatment of such data for interpretation and comparison with similar observed data from a series of compounds and with corresponding functions calculated from proposed structural models were studied. A series of rather elaborate computer programmes to treat the observed data and to calculate the necessary functions was prepared. (Author)

AD-432 344 Div. 25
OTS price $3.60

Midwest Research Inst., Kansas City, Mo.
THE STRUCTURE AND STRENGTH OF EPITAXIAL FILMS.
Bimonthly progress rept. no. 2, 17 Dec 63-17 Feb 64,
by M. Lavik, A. Cunningham and P. Bryant. 16 Mar 64, 34p.
Contract NOw64 0061d, MRI Proj. 2742P
Unclassified report

Descriptors: (*Thin films (Storage devices), Epitaxial growth), (*Epitaxial growth, Thin films (Storage devices)), (*Bibliographies, Thin films (Storage devices)), Structural properties, Vacuum apparatus, Evaporators, Surface properties, Shear stresses.

The literature review initiated in the previous report has been extended and categorized with a coding system. The coded bibliography containing 200 references is included in this report. A vacuum system, evaporation chamber, substrate holder, and straining device have been designed. A brief discussion of these units, with drawings, is included. (Author)

AD-432 348 Div. 25, 4
OTS price $2.50

Naval Ordnance Lab., White Oak, Md.
THE CRITICAL CONDITIONS IN THERMAL EXPLOSION

THEORY WITH REACTANT CONSUMPTION,
by J. Adler and Julius W. Enig. 31 Dec 63, 23p.
Task R360FR105 59
NOL TR63 251 Unclassified report

In cooperation with Imperial Coll. of Science and Tech., London (England).

Descriptors: (*Explosions, Heat of reaction), (*gnition, Temperature), Decomposition, Energy, Kinetic theory, Exchange reactions, Chemical reactions, Combustion, Flames, Heat transfer, Specific heat, Thermal conductivity, Mathematical analysis, Thermochemistry, Theory.

The energy and chemical kinetic equations describing the behavior of a symmetrically heated reactive material with finitie heat of reaction have been analyzed. For first order reactions the relationship betwen the parameters at criticality, and the critical induction period as a function of the parameters are determined. It is shown how the general nth order chemical reaction may be dealt with. The analysis results in an exact ignition temperature and a lower bound to the adiabatic temperature rise at criticality which increase with the order of the reaction. (Author)

AD-432 361 Div. 25
OTS price $1.60

Institute of Field Physics, U. of North Carolina, Chapel Hill.
CROSS SECTIONS OF YANG MILLS QUANTA,
by Edward A. Remler. June 63, 12p. Pub. no. 15
Contract Nonr85507
Unclassified report

Descriptors: (*Electromagnetic fields, Perturbation theory), (*Field theory, Compton scattering), Elementary particles, Quantum mechanics.

This paper gives the results of a calculation of the cross section of the two lowest order (in perturbation theory) processes in which real Yang Mills quanta take part when in interaction with a Dirac type spinor field. (Author)

AD-432 374 Div. 25
OTS price $1.10

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
X-RAY DIFFRACTION STUDIES OF THERMAL MOTIONS IN CRYSTALS.
Quarterly progress rept. no. 17, 1 June-31 Aug 63,
by R. A. Young. 5 Sep 63, 6p.
Contracts Nonr99100, 99106, Projs. NR017 623; A389
Unclassified report

Descriptors: (*Crystals, X-ray diffraction analysis), (*X-ray diffraction analysis, Crystals), Thermal diffusion, Temperature, Motion, Dynamics, Theory, Intensity, Measurements, Heat transfer, Configuration, Quartz, Silicon.

AD-432 376 Div. 25
OTS price $1.10

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
X-RAY DIFFRACTION STUDIES OF THERMAL MOTIONS IN CRYSTALS.
Special rept., 1 Oct 62-30 Sep 63,
by R. A. Young. 16 Oct 63, 4p.
Contracts Nonr99100, 99106, Proj. NR017 623, A389
Unclassified report

Descriptors: (*Crystals, X-ray diffraction analysis), (*X-ray diffraction analysis, Crystals), (*Heat, Motion), Silver compounds, Chlorides, Neutron diffraction analysis, Epitaxiaal growth, Vacuum, Thin films (Storage devices).

AD-432 393 Div. 25
OTS price $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
GROWING HELICAL DENSITY WAVES IN SEMICONDUCTOR PLASMA,
by C. E. Hurwitz. 17 Oct 63, 65p. Technical rept. no. 320,
Contract AF19 628 500
ESD TDR63 587 Unclassified report

Descriptors: (*Plasma medium, Semiconductors), (*Semiconductors, Plasma medium), (*Electromagnetic waves, Density), (*Helixes, Density), Theory, Electrons, Stability, Anomalies, Diffusion, Gas discharges.

A theoretical and experimental study is made of growing screw-shaped waves of electron-hole density in a semiconductor bar subjected to sufficiently large parallel electric and magnetic fields. The formulation of a physical model for the growth mechanism and motion of this helical wave leads to several interesting results. The wave may exhibit growth in two distinctly different forms. For unequal densities of positive and negative carriers, the growth is spatial, corresponding to unidirectional traveling-wave amplification. For equal or nearly equal carrier densities, the growth may be temporal, leading to instability. The latter case corresponds to the helical instability proposed by others as an explanation of the anomalous diffusion in a gas discharge with a longitudinal magnetic field, and of the oscillistor effect in semiconductors. It is shown further that growing helical waves may be obtained in a particularly simple physical configuration. All that is required is a uniform semiconductor bar with a low recombination surface, ohmic contacts, and moderate applied electric and magnetic fields. A detailed and quantitative mathematical description of the growth and propagation characteristics of the waves is presented. Experimentally, the growing helical waves were excited and observed in bars of 30 ohm-cm germanium at and above room temperature. The growth and phase characteristics of the waves were found to be in excellent agreement with the theoretical predictions. (Author)

AD-432 427 Div. 25, 15
OTS price $6.60

Paris U. (France).
STATISTICAL PLASMA THEORY II. PART II. THE KINETIC EQUATION FOR A PLASMA,
by G. Kalman. 1963, 70p. Rept. no. TN5
Contract AF61 052 613
ARL 64 44, pt. 2 Unclassified report

Descriptors: (*Plasma physics, Dynamics), (*Statistical mechanics, Statistical functions), Probability, Statistical distribution, Mathematical prediction, Equations, Partial differential equations, Kinetic theory, Gas ionization.

AD-432 443 Div. 25
OTS price $2.60

National Technical U., Greece.
THE MOIRE METHOD IN THERMAL FIELDS,
by P. S. Theocaris. 1963, 21p.
Contract DA91 591EUC2727
Unclassified report

Descriptors: (*Thermal stresses, Photographic analysis), Mechanical properties, Diffraction

gratings, Photoelasticity, Heat transfer, Strain (Mechanics), Test methods, Tests, Tensile properties, Loading (Mechanics), Temperature, Deformation, Cameras, Sensitivity.

The differential moire method was used for the analysis of strains and stresses in externally loaded bodies at elevated temperatures. A technique was developed to reproduce a crossed grating of a density of 500 lines per inch on the surface of the specimens in both principal directions. This grating resisted temperatures up to the glowing point of the material tested. An arrangement of cameras allows full scale copying of the crossed model grating on the ground glass of a camera. Mechanical interference patterns in both directions were obtained by superimposing various linear master gratings on the image of the model grating. The moire fringes produced in both principal directions of the specimen with master gratings of slightly different pitch were photographed by a second camera. These fringes yielded the displacement distribution of the specimen with great accuracy. (Author)

AD-432 448 Div. 25
OTS price $3.60

California U., Berkeley.
LONGITUDINAL NUCLEAR SPIN-SPIN RELAXATION,
by R. L. Strombotne and E. L. Hahn. 1963, 31p.
Unclassified report

Doctoral thesis.

Descriptors: (*Nuclear spins, Relaxation time), Nuclear magnetic resonance, Theory, Damping, Oscillation, Frequency, Energy, Density, Matrix algebra, Perturbation theory, Degradation, Fluorine, Nuclei.

A theoretical and experimental study is made of the nuclear magnetization which appears after a sudden unidirectional step magnetic field is applied non-adiabatically to an ordered spin system which has been prepared by the process of adiabatic demagnetization. The magnetization exhibits damped oscillations about a non-vanishing equilibrium value. The oscillation frequencies correspond to the fundamental and harmonic components of Larmor frequency determined by the combined effect of local dipole and external step fields. The oscillations arise as the internally ordered dipole-dipole interaction energy exchanges with the suddenly imposed Zeeman energy reservoir. A density matrix calculation carried to second order in time dependent perturbation theory, combined with a gaussian decay model, accounts for the observed oscillations within times comparable to the decay time. Fluorine nuclei in single CaF2 crystals are studied for various crystal orientations with respect to the applied step field. For long times after step field application the attainment of thermal equilibrium between dipole-dipole and Zeeman reservoirs permits prediction, using the spin temperature concept, of magnetization developed along the step field. (Author)

AD-432 449 Div. 25
OTS price $3.60

General Electric Co., Schenectady, N. Y.
A RESEARCH INVESTIGATION OF THE FACTORS THAT AFFECT THE SUPERCONDUCTING PROPERTIES OF MATERIALS.
Progress rept. no. 1, 15 June-15 Dec 63,
by R. W. Schmitt, H. R. Hart, Jr., P. S. Swartz, R. L. Fleischer and C. P. Bean. Dec 63, 32p.
Contract AF33 657 11722
Unclassified report

Descriptors: (*Superconductors, Electrical properties), Electric currents, Density, Alternating current, Theory, Experimental data, Electromagnetic properties, Superconductivity, Metallurgy, Temperature, Niobium.

This report deals with two properties of high field superconductors; namely, their critical current density and a-c losses. These two properties are related to each other, and in this report the phenomenology of this relation is examined in detail, both theoretically and experimentally. The fundamental processes that underlie the phenomenological relationships are the interactions between the electromagnetic structure of type II superconductors and their metallurgical structure. This report describes theoretical and experimental studies of these interactions, especially the effect of surfaces and of radiation-induced defects. A few preliminary studies have also been made of losses in Nb as a function of temperature in which the mechanisms of loss may not be identical to those in high field superconductors. (Author)

AD-432 481 Div. 25, 4
OTS price $1.10

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
(No title).
Quarterly rept. no. 5, 1 July-1 Oct 63,
by A. Smakula. 1 Oct 63, 9p.
Contract Nonr184188
Unclassified report

Descriptors: (*Crystal growth, Halides), (*Halides, Synthesis (Chemistry)), (*Single crystals, Crystal growth), Purification, Strontium compounds, Barium compounds, Lead compounds, Fluorides, Bromides, Dielectric properties, Electrical conductance.

AD-432 497 Div. 25, 30, 17
OTS price $.50

Army Materials Research Agency, Watertown, Mass.
ELECTRIC-POTENTIAL TECHNIQUE FOR DETERMINING SLOW CRACK GROWTH,
by Albert A. Anctil, Eric B. Kula and Eugene DiCesare. Dec 63, 13p.
DA Proj. 1A024401A11002
AMRA TR63 27 Unclassified report

Descriptors: (*Fracture (Mechanics), Test methods), (*Electric fields, Electric potential), Propagation, Measurement, Steel, Toughness, Sheets.

Slow crack growth was followed as a function of applied load during fracture toughness testing of high-strength sheet materials (4340 and 300M steels) by means of continuous measurement of electric potential field changes across the crack. The instrument employed is a commercially available milliohmmeter and uses the ammeter-voltmeter measurement method with a minimum of current passing through the test specimen. Voltage drop across the crack, rather than resistance, is measured. Electronic and mechanical testing techniques are described. Typical potential field distribution diagrams illustrate the potential change with crack growth. A single calibration curve for crack size versus potential drop may be obtained independent of material and specimen configuration by maintaining geometrical similarity of current and potential contacts. Calibration data are readily obtainable for any specimen design by duplicating the specimen in aluminum foil and simulating crack growth with a razor. (Author)

AD-432 550 Div. 25
OTS price $2.60

Uppsala U., Sweden.
COMPUTATION OF THE COHESIVE ENETGY, THE LATTICE PARAMETER, AND THE COMPRESSIBILITY OF TONIC CRYSTALS BY USING RADIALLY DEFORMED ATOMIC ORBITALS. I. THEORY,
by Kauko Mansikka. 1 Sep 63, 24p. Scientific rept. no. 2
Contract AF61 052 701
ARL 64 47 Unclassified report

Descriptors: (*Crystals, Atomic orbitals), Ious, Theory, Series, Halides.

The expression for cohesive energy of ionic crystals in the Heitler-London approximation has been derived from radially deformed atomic orbitals. The orbitals have been obtained by scaling the radial parts of the wave functions belonging to the corresponding free ions. For small values of the parameter the wave functions can be expanded into the power series. Consequently, the cohesive energy can be expressed as a power series in a similar way, where the first term represents the cohesive energy of the free ion approximation. The energy relations are also studied when the uniform partial scaling and uniform over-all scaling are coupled together. The results obtained are most useful for numerical applications, where the self-consistent field functions are employed in the numerical form. (Author)

AD-432 664 Div. 25
OTS price $5.60

Cambridge Acoustical Associates Inc., Mass.
A VARIATIONAL SOLUTION OF SOLID AND FREE-FLOODING CYLINDRICAL SOUND RADIATORS OF FINITE LENGTH,
by Miguel C. Junger. 1 March 64, 56p. Technical rept. U177 48
Contract Nonr2739 00, Task 185 301
Unclassified report

Descriptors: (*Acoustics, Diffraction), (*Transducers, Sonar), Cylindrical bodies, Vibration, Green's function, Mathematical models, Integral transforms, Fourier analysis.

Finit length effects in solid cylindrical sound sources and in free-flooding squirters are evaluated by means of a variational technique which parallels the Levine-Schwinger variational principle for for diffraction problems. The radiation impedance is expressed as the sum of two components: (1) the impedance computed from Robey's mathematical model which has been generally applied to cylindrical transducers, but which does not account for and effects; (2) the impedance assoicated with the radial velocity distribution over the two semi-infinite cylindrical surfaces extending the radiating surface. This technique is also applied to longitudinal modes of the solid cylinder, and to non-axisymetric modal configurations. A subsequent report (CAA U-178-48) extends this analysis to arrays of coaxial free-flooding ring-transducers. (Author)

AD-432 68? Div. 25, 15
OTS price $6.60

Paris U. (France).
LONGITUDINAL DIELECTRIC CONSTANT OF A FULLY IONIZED PLASMA,
by J. Coste. 15 Nov 63, 65p. Technical note no. 6
Contract AF61 052 613
ARL 64 45 Unclassified report

Descriptors: (*Plasma physics, Kinetic theory), (*Statistical mechanics, Equations), Particles, Statistical distribution, Probability, Statistical functions, Gas ionization, High frequency, Integral transforms.

Starting from the kinetic equations of Guernsey, and using a high frequency or short wave length approximation, one finds out the dielectric constant of a plasma. This dielectric constant contains the effects of the correlations, up to the first order in the expansion plasma parameter. Equilibrium quantities are obtained from the dielectric content. (Author)

AD-432 701 Div. 25, 15
OTS price $5.60

Paris U., (France).
STATISTICAL PLASMA THEORY II. PART I. THE DIELECTRIC CONSTANT OF A PLASMA,
by G. Kalman. 1963, 60p. Rept. no. LP 28
Grant AF AFOSR61 052 613
ARL 64 44, pt. 1 Unclassified report

Papers presented at seminar, 1963.

Descriptors: (*Plasma physics, Dielectric properties), (*Permeability, Particles), Field theory, Statistical functions, Statistical distribution, Statistical mechanics, Magnetic fields, Gas ionization.

AD-432 703 Div. 25, 15
OTS price $5.60

Dewey, G. C. and Co., Inc., New York.
CALCULATION OF DIPOLE MATRIX ELEMENTS,
Final rept.,
by S. Borowitz and M. Vassell. Feb 64, 53p.
Contract AF29 601 5342, Proj. 3121
RTD TDR63 3111
Unclassified report

Descriptors: (*Quantum mechanics, Programming computers), Matrix calculus, Mathematical analysis, Programming lauguages, Differential equations, Electrons, Cesium, Ionization, Numerical method and procedures, Probability, Analysis of variance, Perturbation theory, Ions, Field theory, Special functions (Mathematical), Statistical mechanics, Energy.

Dipole matrix elements for 7s - np transitions in cesium were calculated using model wave functions of an electron moving in a Thomas-Fermi Ion core. The calculated values for the energy levels using this model are in error by approximately 9% for the 7s state and are somewhat greater for the p states. The dipole matrix elements calculated for this model are in error by about a factor of three. A variational principle has been derived for off diagonal matrix elements of any operator. This principle provides no corrections for this model and for the Hartree Model, but has application if simple trial wave functions are used. (Author)

AD-432 717 Div. 25
OTS price $1.10

Illinois U., Urbana.
RESEARCH IN THE PHYSICS OF SOLIDS.
Final rept., 1 Oct-30 Sep 63,
by Frederick Seitz. 30 Dec 63, 5p.
Contract AF49 638 528, Proj. 9763
AFOSR 64 0411 Unclassified report

Descriptors: (*Research program administration, Solid state physics), Reports, Superconductivity, Personnel, Absorption.

AD-432 723 Div. 25, 30
OTS price $3.60

Stanford U., Calif.
IMPERFECTIONS, A MAIN CONTRIBUTOR TO SCATTER IN EXPERIMENTAL VALUES OF BUCKLING LOAD,
by Samuel C. Durham. Nov 63, 34p.
Contract DA44 177AMC115T
Unclassified report

Master's thesis.

Descriptors: (*Structural shells, Cylindrical bodies), (*Tests, Deformation), Theory, Test methods, Loading (Mechanics), Compressive properties, Load distribution, Surfaces.

A novel approach for testing cylindrical shells is developed. A method of buckle restriction by use of an internal mandrel located at 1t from the surface of the shell is used. By means of this device it is possible to elastically buckle the shell until the shell is completely filled with buckles. It is shown that the variation of the rate of change in number of buckles as a function of the applied load follows a Gaussian distribution. The mode of the Gaussian curve is located at a load level which agrees very closely with the critical buckling load computed from the classic formula. It is considered that the evidence presented is substantial support for the small displacement theory and a strong indication that buckling takes place first at the weakest section of the shell and the amount of buckling is a function of the area of weakness. (Author)

AD-432 757 Div. 25
OTS price $10.50

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
SOME NONLINEAR VIBRATION AND RESPONSE PROBLEMS OF CYLINDRICAL PANELS AND SHELLS,
by Benjamin E. Cummings. June 62, 131p.
Rept. no. SM62 32
Contract AF49 638 220
AFOSR 3123 Unclassified report

Report on Aeroelasticity and Structural Dynamics.

Descriptors: (*Structural shells, Cylindrical bodies), (*Panels (Structural), Cylindrical bodies), (*Vibration, Nonlinear systems), (*Cylindrical bodies, Panels (Structural)), Nonlinear differential equations, Partial differential equations, Numberical, Analysis.

Large amplitude vibrations and forced response of curved panels and shells are studied by the application of the shallow shell equation. The Galerkin procedure is used to reduce the nonlinear partial differential equations to ordinary nonlinear equations. Marked differences are found between the behavior of curved panels and cylindrical shells. Relations for the dependence of the free vibration period on amplitude are given. A two mode analysis of the cylindrical shell problem is included. The curved panel is found to exhibit a buckling phenomenon for the simple breathing modes. Shock response methods are used to predict dynamic buckling of the curved panel and the predictions are verified by numerical integration. The cylindrical shell vibrations and responses are found to be governed by Duffing's equation and certain of the well-known properties of Duffing's equation are applied to the cylindrical shell dynamics. The two mode analysis of the cylindrical shell is shown to exhibit weak coupling, allowing the separate excitation of the coupled modes. Some numerical results are given. (Author)

AD-432 763 Div. 25, 30
OTS price $1.60

Stanford U., Calif.
THE EFFECT OF RESTRICTING BUCKLE DEPTH IN CIRCULAR CYLINDRICAL SHELLS REPEATEDLY COMPRESSED TO THE BUCKLING LIMIT,
by W. H. Horton and S. C. Durham. Nov 63, 20p.
Rept. no. AER174
Contract AF49 638 1276
Unclassified report

Descriptors: (*Structural shells, Cylindrical bodies), (*Deformation, Compressive properties), Nickel, Tests, Loading (Mechanics), Load distribution, Mandrels, Pressure.

The reduction in critical buckling load for a thin-walled cylindrical shell which occurs under repeated compression is a function of the depth to which the buckle is permitted to develop. It shows that a nickel cylinder whose R/t is of the order of 400 does not experience any load reduction on repeated load when the buckle depth never exceeds the thickness of the shell, and that buckle depths which are equal to or greater than 2.5t give the same results as are obtained in unrestricted buckling. It proves, too, that by using the method of buckle restriction it is possible to cause a cylindrical shell to buckle uniformly over its entire length. (Author)

AD-432 790 Div. 25
OTS price $1.10

Yeshiva U., New York.
STATISTICAL MECHANICS OF TRANSPORT PROPERTIES IN NON-EQUILIBRIUM AND DISSIPATIVE SYSTEMS.
Final rept. 1 Oct 61-1 Oct 63,
by J. L. Lebowitz. Dec 63, 7p.
Grant AF AFOSR62 64
AFOSR 64 0237 Unclassified report

Descriptors: (*Statistical mechanics, Transport properties), (*Transport properties, Statistical mechanics), Atoms, Equations, Temperature, Equations of state, Mixtures, Density, Theory, Gases, Thermodynamics, Fluids, Functions, Distribution, Quantum statistics.

AD-432 791 Div. 25
OTS price $1.10

St. Johns U., Jamaica, N. Y.
(No title).
Final rept., Sep 58-Aug 63,
by S. Nevil Milford and Edward A. Burk. Aug 63, 3p.
Contract Nonr260400, Proj. NR012 106, NR019 620
Unclassified report

Descriptors: (*Gas ionization, Atomic energy levels), (*Atmoic energy levels, Gas ionization), (*Atomic properties), Plasma medium, Plasma physics, Atoms, Molecules, Solar atmosphere, Density, Temperature, Hydrogen, Protons.

AD-432 824 Div. 25
OTS price $1.60

Yale U. Observatory, New Haven, Conn.
INTERACTION OF RADIATION AND MATTER IN A PLASMA,
by Ludwig Oster. Feb 64, 20p.
Contract AF33 616 7271, Proj. 7073, Task 7073 01
ARL 64 24 Unclassified report

Report of High Energy Plasma Generation and Control.

Descriptors: (*Plasma medium), Energy, Thermodynamics, Emissivity, Absorption, Gas ioniza-

tion, Magnetic fields,Theory, Quantum mechanics, Bremsstrahlung, Refractive index, Cyclotron waves.

A summary is given of the present state of the investigations carried out at the Yale Observatory on interactions between radiation and matter in a plasma. In particular, results based on a new transfer equation of radiation in dispersive media, and a discussion of some practically interesting cases of departures from local thermodynamic equilibrium in continuous energy states are given. (Author)

AD-432 825 Div. 25
OTS price $1.60

Franklin Inst., Philadelphia, Pa.
TORQUE AND ROTATIONAL HYSTERESIS IN FCC SINGLE CRYSTAL COBALT FILMS,
by William D. Doyle. Dec 63, 11p. Rept. no.. SR1
Contract AF19 628 2415, Proj. 5635, Task 563503
AFCRL 64 41 Unclassified report

Paper presented at Ninth Magnetics Conference, Atlantic City, N. J., Nov 63.

Descriptors: (*Cobalt, Metal films), (*Single crystals, Symmetry (Crystallography)), Hysteresis, Anisotropy, Epitaxial growth, Alloys, Ferromagnetic materials, Torque, Rotation, Thickness, Electron diffraction analysis.

The Stoner-Wohlfarth coherent rotation model is extended to the case of biaxial anisotropy. The rotational hysteresis integral W equals 1.54. Measurements on fcc single crystal Co films (-k = 4 - 6 x 105 ergs/cc) prepared by epitaxial evaporation onto the (100) face of single crystal MgO slabs held at 400 C yield results in wide disagreement with the theory. While the expected angular symmetry of the torque is observed the model does not correctly predict the magnitude of the torque nor the fields at which specific types of angular dependence will be observed. The magnetization reversal process in single crystal Co films is not coherent and that as in the case of polycrystalline films noncoherent rotations or wall motions must be investigated. This situation in single element, single crystal films calls for a reappraisal of the importance of compositional inhomogeneities, and local crystalline anisotropy in polycrystalline alloy films. (Author)

AD-432 828 Div. 25, 8
OTS price $7.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EQUATIONS AND TABLES FOR THERMOCOUPLES 32 F REFERENCE JUNCTION,
by W. E. Spengler and D. K. Graham. Mar 64, 75p.
Contract AF406001000 , ARO Proj. 932002
AEDC TDR64 55 Unclassified report

Descriptors: (*Thermocouples, Tables), Equations, Temperature, Electric potential, Polynomials, Curve fitting, Errors, Nickel alloys, Copper alloys, Chromium alloys, Iron alloys, Signals, Wind tunnels, Least squares method.

National Bureau of Standards tables of electromotive-force versus temperature for thermocouples have been fitted to third degree polynomials in parts. The resulting coefficients are presented for six types of thermocouples. Tables derived from the fitted equations are also presented. (Author)

AD-432 857 Div. 25
OTS price $1.60

Franklin Inst., Philadelphia, Pa
VOIDS IN AGED SINGLE CRYSTAL PERMALLOY FILMS,
by Alfred Baltz Dec 63, 15p. Rept. no. SR2
Contract AF19 628 2415, Proj. 5635, Task 563503
AFCRL 64 42 Unclassified report

Paper presented at Philco Corp. Single Crystal Film Conference, Apr 63.

Descriptors: (*Single crystals, Aging (Materials)), (*Metal films, Aging (Materials)), (*Metallic crystals, Epitaxial growth), Vapor plating, Sodium compounds, Chlorides, Nickel alloys, Iron alloys, Electron diffraction analysis, Vacuum apparatus, Oxidation.

Permalloy films epitaxially grown on NaCl in a vacuum of 10 to the -9th torr were examined before and after aging at room temperature. The original films were near perfect single crystals exhibiting rather sharp Kikuchi lines. After aging the films for two months, regions were observed which were considerably thinner than the rest of the film. Diffraction patterns of these thin regions showed that they were polycrystalline and could be identified as nickel oxide. The remainder of the film was still single crystalline. After aging for three months the thin regions had deteriorated into voids whose sides were oriented along crystallographic directions. Square, rectangular and octagonal voids were observed, depending upon whether the voids lay in (100) (110) or (111) planes. (Author)

AD-432 897 Div. 25
OTS price $11.00

Gordon McKay Lab. of Applied Science, Harvard U., Cambridge, Mass.
TRANSPORT PROPERTIES AND BAND STRUCTURE OF GRAY TIN,
by Steven H. Groves. Dec 63, 147p. Technical rept. no. HP10
Contract Nonr186610, Proj. NR017 308
Unclassified report

Descriptors: (*Tin, Transport properties), Electrical conductance, Hall effect, Pressure, Temperature, Semiconductors, Energy, Electrons, Mathematical models, Cadmium compounds, Tellurium compounds, Indium compounds, Antimony compounds, Valence, Germanium.

This report describes an experimental investigation of the dependence of the electrical conductivity and Hall coefficient of gray tin on pressure and temperature. An empirical rule for pressure coefficients has been found from previous studies on many of the group IV and group III - group V semiconductors: the pressure coefficient of a particular energy gap depends on the symmetry of the electron states involved but varies little from material to material. By assuming that this rule includes gray tin, it is possible to suggest a new model for the band structure. This model can be constructed from the more familiar semiconductor band structure if the energy gap is systematically extrapolated from CdTe and InSb to gray tin. The proposed medel is compatible with the results of ther experiments. Other models of the band structure are discussed and it is shown that the behavior predicted from them is often in poor agreement with the experimental results. Finally, it is suggested that the proposed band structure may apply to some other materials. (Author)

Division 25 - PHYSICS

AD-432 927 Div. 25, 13
OTS price $3.60

Institute of Tech., U. of Minn, Minneapolis.
THE DYNAMICAL EQUATIONS FOR BEAMS,
by W. H. Warner. 9 Mar 64, 32p.
Contract Nobs86783
Unclassified report

Descriptors: (*Beams (Structural), Equations), (*Dynamics, Beams (Structural)), Flat plate models, Linear systems, Elasticity, Vibration, Loading (Mechanics), Stresses, Theory, Shear stresses, Anisotropy, Mathematical models.

AD-432 931 Div. 25, 1, 15
OTS price $19.75

Naval Research Lab., Washington, D. C.
SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS.
PART II.
Feb 64, 309p.
NRL Bulletin no. 33, pt. 2
Unclassified report

Papers presented at the 33rd Symposium on Shock, Vibration and Associated Environments held in Washington, D. C. on 3-5 Dec 63.

Descriptors: (*Vibration, Symposia), (*Spacecraft, Vibration), (Shock (Mechanics), Symposia), Shock waves, Noise, Energy, Damping, Acoustics, Mathematical prediction, Data processing systems, Statistical analysis, Correlation techniques.

AD-432 958 Div. 25, 14, 17
OTS price $7.60

ARA, Inc., West Covina, Calif.
RESEARCH ON ENERGY ABSORBING STRUCTURES, Pt. II.
Final rept., Feb 63-Feb 64,
by D. L. Platus, S. Uchiyama, P. J. Cunningham, F. A. Marovich and H. H. Freeman. Feb 64, 74p.
Contract AF49 638 1144, Proj. 9782, Task 37718
AFOSR FSR64 0154 Unclassified report

Descriptors: (*Cylindrical bodies, Deformation), (*Conical bodies, Deformation), (*Structural shells, Deformation), Mathematical analysis, Stresses, Slender bodies, Theory, Energy, Plasticity, Creep, Damping, Aerodynamic loading.

Analytical methods for predicting the large-deformation behavior of currugated cylindrical and conical shell structures are presented, and tests with simple corrugated specimens for evaluating the theoretical predictions are described. Tests on corrugated strips loaded into the plastic range for evaluating previously developed analyses are described, and correlations with theoretical predictions are shown. A novel bimetallic flexural spring damper is described. Moment-curvature tests to demonstrate the behavior are discussed and correlations with theoretical predictions are shown. (Author)

AD-432 987 Div. 25, 15
OTS price $1.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
WAVE PROPAGATION IN VARIABLE MEDIA.
Final rept., 1 Apr 58-31 Oct 63.
31 Oct 63, 12p.
Contract AF19 604 3495, Proj. 5631, Task 563104
AFCRL 64 28 Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Electromagnetic waves, Research program administration), Mathematical models, Electron density, Ionosphere, Scattering, Statistical mechanics, Magnetohydrodynamics.

This report summarizes research activities of the Division of Electromagnetic Research of the Courant Institute of Mathematical Sciences at New York University under Contract Number AF19 604 3495. The research described is in the field of wave propagation in variable media and mathematical problems related to such studies. (Author)

AD-432 990 Div. 25
OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
MAXIMUM LIKELIHOOD ESTIMATION FOR DISTRIBUTIONS WITH MONOTONE FAILURE RATE,
by Albert W. Marshall and Frank Proschan. Feb 64, 15p. Document no. D1 82 0329; MN336
Unclassified report

Also available from the author.

Descriptors: (*Statistical functions, Probability), Sampling, Game theory.

Using the idea of maximum likelihood, we derive an estimator for a distribution function possessing an increasing (decreasing) failure rate and also obtain corresponding estimators for the density and the failure rate. We show that these estimators are consistent. (Author)

AD-432 994 Div. 25, 4
OTS price $2.20

Cincinnati U., Ohio.
NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY LONG RANGE P-31 - H1 SPIN-SPIN COUPLING,
by Fred Kaplan, Gurdial Singh and Hans Zimmer.
21 Nov 63, 5p. Rept. no. TR6
Grant DAARO D31124C122
AROD 2276 6 Unclassified report

Descriptors: (*Nuclear spins, Nuclear spectroscopy), (*Phosphorus, Nuclear spins), (*Hydrogen, Nuclear spins), Nuclear magnetic resonance, Organic phosphorus compounds, Organic nitrogen compounds, Fluorine, Ethers.

AD-433 007 Div. 25
OTS price $6.60

Aerospace Corp., Los Angeles, Calif.
GENERAL RESEARCH. ENERGY TRANSFER PROCESSES IN A PARTIALLY IONIZED, TWO-TEMPERATURE GAS,
by Donald M. Dix. 2 Mar 64, 64p. Rept. no. ATN 64 9232 1
Unclassified report

Descriptors: (*Gas ionization, Energy), (*Energy convection), Hydrogen, Ions, Plasma sheath, Electrons, Electric fields, Temperature, Analysis, Heat transfer, Diffusion, Thermal conductivity, Equations, Transport properties, Boundary layer transition.

The elementary situation of convective energy transfer between parallel plates at different temperatures is analyzed for partially ionized, non-reacting, monatomic hydrogen wherein the electrons may be at a temperature different from that of the heavier species. The gas conditions considered are such that an ion sheath, less than a mean free path in spatial extent, forms on the fully catalytic colder surface. The numerical results obtained indicate that: (1) the gross features of the continuum solution are rather insensitive to the models of sheath and transition regions employed; (2) the energy transfer between ions and electrons due to the electric field external to the sheath is appreciable, particularly in its effects of reducing electron temperature; (3) thermal nonequilibrium effects on total heat

transfer are not as great as might be anticipated, due to energy transfer between species by electric fields and the contribution of diffusional processes; (4) magnetic field effects on total heat transfer are less than the effect on electronic thermal conductivity would indicate and are lessened further by thermal nonequilibrium effects. (Author)

AD-433 019 Div. 25, 4
OTS price $1.10

California U., Riverside.
BEHAVIOR OF SOLIDS UNDER PRESSURE.
Annual progress rept.
by A. W. Lawson. Oct 63, 7p.
Contract Nonr 184205, Proj. NR017 314
Unclassified report

Descriptors: (*High-pressure research, Abstracts), X-ray diffraction analysis, Cesium, Europium compounds, Sulfides, Dielectric properties, Silver compounds, Bromides, Thallium compounds, X Band, Transition temperatures, Resistance (Electrical), Copper compounds, Mercury compounds, Iodides.

AD-433 042 Div. 25
OTS price $1.60

Ecole Normale Superieure, (France).
RADIATION DAMAGE IN SEMICONDUCTORS.
Annual summary rept. no. 2
by P. Baruch. 23 July 63, 13p.
Contract AF61 052 543
AFCRL 63 578 Unclassified report

Descriptors: (*Semiconductors, Radiation damage), (*Radiation damage, Semiconductors, (*Crystal lattice defects, Semiconductors), Silicon, Germanium, Electron beams, Piston beams, Diffusion, Impurities, Energy, Electrical conductance, Infrared radiation, Absorption, Cryogenics, High-temperature research, Diodes (Semiconductors).

This report describes a study of radiation enhanced diffusion in silicon. The same enhancement of diffusion as with protons is observed in electron-irradiated silicon. This conforms the point-defect mechanism proposed earlier. The proton-irradiated samples have been observed by X-ray microtopography and show a pattern of strains due to smallscale defects, but no new extended dislocations. Low temperature irradiation of Germanium is described. Stored energy measurements after a 14 K electron irradiation have been attempted, but the effect is masked by thermal phenomena accompanying the adsorption of residual gases in the calorimeter chamber. Radiation-induced defects in Silicon can drift in the electric field of a p-n junction, as in Germanium. At 288 K, there is drifting of defects with different charges, the acceptortype (negatively charged) being the slower. (Author)

AD-433 133 Div. 25
OTS price $9.10

San Andres U., La Paz (Bolivia).
TIME VARIATIONS IN COSMIC RAYS AND RADIOSONDE MEASUREMENTS.
Final technical rept.,
by Ismael Escobar. Jun 63, 105p. Rept. no. 25
Grant AF AFOSR62 395
AFOSR J1338 Unclassified report

Descriptors: (*Cosmic rays, Intensity), (*Electromagnetism, Solar atmospheres), (*Solar disturbances, Terrestrial magnetism), (*Radiosondes, Measurement), Solar wind, Diurnal variations, Magnetic fields, Bibliography, Solar radiation, Planetary atmospheres, Solar corona.

The study of cosmic ray intensity variations provides information regarding the parameters that characterize the solar wind at any given time. The study of quiet day solar diurnal variation of cosmic rays indicates that solar wind velovity is usually above 100 km/sec and it undergoes a 22-year cyclic change. The shift to earlier hours of the time of maximum of disturbed day solar diurnal variation observed during early stages of the cosmic ray storms enables one to choose between Parker's blast wave model and the magnetic tongue model for the configuration of interplanetary magnetic field. Observations fit the blast wave model better. A qualitative model, in which solar wind plays a major role, is presented to explain the gross features of the secular variation of isotropic intensity of cosmic rays in terms of currently most accepted ideas. The model requires that the interplanetary magnetic field should extend over a distance of several tens of A.U. from the sun. (Author)

AD-433 142 Div. 25, 27
OTS price $14.00

Northrop Space Labs., Hawthorne, Calif.
EXPERIMENTAL AND ANALYTICAL INVESTIGATIONS OF CROSSED-FIELD PLASMA ACCELERATORS. PART II. REPORT OF ALL ANALYTIC AND EXPERIMENTAL RESULTS,
by P. D. Lenn, J. R. Bodoia and S. T. Demetriades.
May 63, 203p. Rept. no. 63ASRM1307
Contract AF33 657 8558
ASD TDR63 307, pt. 2 Unclassified report

Descriptors: (*Plasma physics, Ion accelerators), (*Ion accelerators, Heat transfer), Electrodes, Pressure, Magnetic fields, Hall effect, Erosion, Magnetohydrodynamics, Arc-jet engines, Plasma jets, Plasma engines, Propulsion, Heat transfer.

Experimental and analytical investigations of the component physical phenomena and over-all operation of linear crossed-field accelerators of single and multiple electrode-pair designs are presented. Analysis and experimental measurements are given for heat transfer to accelerator components; effects of geometry, power level, pressure, magnetic field strength and tensor conductivity on accelerator performance; and over-all operating characteristics of accelerators over a range of operating conditions. (Author)

AD-433 166 Div. 25
OTS price $8.10

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
MODAL ANALYSIS AND SYNTHESIS OF ELECTROMAGNETIC FIELDS,
by L. B. Felsen and N. Marcuvitz. 18 Dec 63, 81p.
Rept. no. RR1124 63
Contract AF19 604 7499, Proj. 4600, Task 460004
AFCRL 64 39 Unclassified report

Descriptors: (*Electromagnetic fields, Synthesis), (*Crystals, Solid state physics), Symmetry (Crystallography), Anisotropy, Diffraction, Green's function, Plasma physics, Dielectrics, Ferrites, Wave transmission, Optical properties, Propagation, Transmission lines, Equations, Waveguides.

AD-433 167 Div. 25
OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
FOCUSING BY AN ANISOTROPIC PLASMA INTERFACE,
by L. B. Felsen. 25 Oct 63, 31p. Rept. no. SR3; RR1202 63
Contract AF19 628 2357, Proj. 5635
AFCRL 63 584 Unclassified report

Descriptors: (*Electromagnetic waves, Focusing), (*Plasma medium, Anisotropy), Plasma physics, Optics, Magnetic fields, Refractive index, Excitation, Integrals, Propagation, Electric currents, Energy.

When an electromagnetic source confined in a homogeneous, anisotropic plasma half space radiates into the exterior medium, focusing effects may occur wherein the influence of the plane interface bounding the plasma is similar to that of an optical lens. The existence and location of the caustics and focus depends on the various plasma parameters, in particular on the strength and orientation of the externally applied magnetic field, and the refractive index curves for the medium may be used advantageously for the prediction of their properties. After a qualitative discussion pertaining to the general gyrotropic case, a detailed field evaluation for line source and dipole excitation is carried out for the special problem of uniaxial anisotropy, corresponding to an infinitely strong external magnetic field. In this instance, the ray system and the caustics may be described in simple terms and expressions are given for the fields inside or outside focusing region. (Author)

AD-433 174 Div. 25
OTS price $12.00

Wheeler Labs., Inc., Great Neck, N. Y.
STUDY OF LASER OUTPUT PARAMETERS AND MEASUREMENT TECHNIQUES.
Final rept., 20 May-20 Nov 63,
by E. R. Schineller, H. M. Heinemann, H. W. Redlien and R. A. Kaplan. Feb 64, 163p. Rept. no. 1182
Contract AF30 602 3132, Proj. 5519, Task 551903
RADC TDR63 564 Unclassified report

Descriptors: (*Lasers, Instrumentation), (*Electromagnetic waves, Measurement), Energy, Radiation weapons, Power, Propagation, Welding, Machining, Display systems, Optics, Frequency, Interferometers, Diffraction gratings, Prisms (Optics), Lenses, Mirrors, Optical equipment, Illumination.

A detailed study was made of the laser parameters associated with system applications involving both energy and information transfer. The approach to the study included a discussion of the fundamental properties of EM radiation, independent of specific laser types, the determination of system parameters, and their relation to these fundamental properties. The specific output parameters of the solid state, gaseous, and diode lasers were computed theoretically and finally measurement principles were reviewed. The study resulted in definitions of a wide variety of parameters needed to describe the many different properties of laser radiation in space and time. However, the parameters have been grouped with respect to applications to provide unification and simplification. The results are presented in a set of tables of indicated system parameters, system relations, and the applicable laser parameters. (Author)

AD-433 193 Div. 25
OTS price $5.60

Midwest Research Inst., Kansas City, Mo.
ULTRASONIC WAVE PROPAGATION AND INTERACTION IN SOLID MATERIALS.
Rept. for 1 Mar-28 Nov 63,
by F. R. Rollins and L. Taylor. Mar 64, 59p.
Contract AF33 657 11006, Proj. 7360, Task 736002
ML TDR64 21 Unclassified report

Report on The Chemistry and Physics of Materials.

Descriptors: (*Ultrasonic radiation, Propagation), (*Solids, Ultrasonic radiation), Vector analysis, Theory, Scattering, Intensity, Elasticity, Anisotropy, Quantum mechanics, Perturbation theory, Operators (Mathematics), Frequency.

The interaction of ultrasonic beams in solid media has been investigated from both the theoretical and experimental viewpoint. An error in the previously reported classical calculation has been corrected and relatively good qualitative agreement now exists between the classical and quantum mechanical calculations. Experiments are described which verify certain theoretical predictions concerning the magnitude of interaction and the conditions of resonance. Techniques have been devised for producing interaction in specimens of unusual shape. The feasibility of using interaction techniques in making a three-dimensional analysis of elastic anisotropy has been demonstrated. (Author)

AD-433 202 Div. 25, 22
OTS price $2.60

Virginia Polytechnic Inst., Blacksburg.
ON THE DYNAMIC RESPONSE OF A FLUID-FILLED CYLINDRICAL SHELL TO AN AXIALLY PROPAGATING PRESSURE WAVE, PART III.
Final rept.,
by D. Frederick and W. W. King. 15 Feb 64, 24p.
Contract N189 18156489A
Unclassified report

Descriptors: (*Cylindrical bodies, Mechanical waves), (*Pipes, Underwater explosions), Shock waves, Structural shells, Vibration, Elasticity, Equations, Fluids, Liquids, Pressure, Mechanical waves, Propagation, Mathematical analysis, Underwater sound, Acoustics, Bessel functions.

AD-433 207 Div. 25, 14
OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
BRITTLE FRACTURE OF CERAMICS,
by E. Stofel and H. Conrad. 21 Mar 64, 54p.
Rept. no. TDR269 4240 10 7
Contract AF04 695 269
SSD TDR63 382 Unclassified report

Descriptors: (*Ceramic materials, Mechanical properties), (*Fracture (Mechanics), Ceramic materials), (*Glass, Mechanical properties), Plasticity, Crystal lattice defects, Stresses, Microstructure, Statistical analysis, Ceramic fibers, Theory, Design, Aluminum compounds, Oxides, Brittleness, Reviews.

A review is given of the present state of our knowledge of the brittle fracture of ceramics. This includes discussions of the theoretical strength of solids, the Griffith theory, and the role of dislocations. Other topics covered are effects of environment, stress distribution, microstructure, and Weibull's theory. It is concluded that, although we are not yet able to quantitatively predict the behavior of ceramics in engineering structures, the available theoretical and experimental information can be useful as a qualitative guide for the development of ceramics with improved properties, as well as design of components, and for reduction of the number of proof tests required. (Author)

AD-433 208 Div. 25, 22
OTS price $6.60

Virginia Polytechnic Inst., Blacksburg.
ON THE DYNAMIC RESPONSE OF STIFFENED RECTANGULAR

PLATES SUBJECTED TO TIME DEPENDENT EDGE CONDITIONS.
Final rept.,
by D. Frederick and T. E. Falgout. 15 Feb 64, 64p.
Contract N189 181 56489A
Unclassified report

Descriptors: (*Metal plates, Dynamics), (*Ship decks, Vibrations), Underwater explosions, Dynamics, Equations, Ship structural components, Mathematical analysis, Velocity, Stresses, Joints.

AD-433 218 Div. 25, 16, 8
OTS price $5.60

Martin-Marietta Corp., Orlando, Fla.
LASERS AND THEIR EFFECTS.
Annual progress rept., 1 Jul 63-1 Mar 64,
by James H. Burkhalter. 1 Apr 64, 54p. Rept. no. OR3885
Contract DA49 193MD2456
Unclassified report

Descriptors: (*Lasers, Biology), Instrumentation, Heat exchangers, Lenses, Damage, Calorimeters, Biological laboratories, Paramagnetic resonance, Design, Electrons, Spin, Measurement, Power supplies, Circuits, Electronics, Radiation damage, Radiation effects, Temperature, Cryogenics.

The biological effects of lasers and laser radiation are described. Design and construction of a research laser and associated instrumentation is included. Important problems investigated for various biological researchers and the approaches used are discussed. (Author)

AD-433 232 Div. 25
OTS $4.60

Lexington Labs. Inc., Cambridge, Mass.
VAPOR PHASE GROWTH OF SINGLE CRYSTALS.
Final rept. 1 Nov 62-31 Dec 63,
by Philip S. Schaffer. Jan 64, 47p.
Contract AF19 628 2383, Proj. 4608, Task 460805
AFCRL 64 57 Unclassified report

Descriptors: (*Crystal growth, Single crystals), (*Vapor plating, Epitaxial growth), Etched crystals, Sapphires, Crystal Lattice defects, Symmetry (Crystallography), Spectroscopy, Chemical analysis, Quartz, Temperature, Vacuum furnaces, X-ray diffraction analysis, Refractive index, Impurities, Magnesium, Aluminum, Calcium, Manganese, Iron, Nickel, 1134 Copper, Silver, Lead, Injectors, Evaporators, Thermodynamics.

A chemical vapor deposition process was developed for epitaxial growth of sapphire single crystals. Apparatus was designed and constructed for use in the crystal growth process. Oriented crystals weighing up to five grams were grown at temperatures considerably below the melting point. The rate of growth for constant gas compositions and flow rates was found to increase with an increase in temperature. Etch pit studies showed an average dislocation density of 100 dislocations sq cm. Spectrochemical analyses incicated total impurity levels below 40 ppm. (Author)

AD-433 235 Div. 25
OTS price $1.00

Aeronautical Structures Lab., Naval Air Engineering Center, Philadelphia, Pa.
LIQUID METAL MAGNETOHYDRODYNAMIC POWER CONVERSION.
by Gene B. Stafford. Sep 63, 30p.
ASD TDR63 700 Unclassified report

Presented at the ASD 1963 Science and Envineering Symposium, 18-19 Sep 63, held at Wright-Patterson Air Force Base, Ohio.

Descriptors: (*Liquid metals, Generators), (*Magnetohydrodynamics, Energy conversion), Electromagnetic fields, Power, Fluid flow, Electrical conductance, Theory, Electrodes, Resistance (Electrical), Entropy, Permeability (Magnetic), Measurement, Fluids, Electromagnetic properties.

The basic operating characteristics of a straight channel, conduction, liquid metal magnetohydrodynamic (MHD) generator are presented. The ideal case is presented and then the various losses which might occur are introduced along with means of compensating for them. Two systems are shown which can utilize a liquid metal MHD generator. Criteria for the selection of the working fluids are shown and possible candidate working fluids are presented. (Author)

AD-433 238 Div. 25
OTS price $1.50

Research and Technology Div., Air Force Systems Command, Washington, D. C.
THE EFFECT OF AN ELECTROSTATIC FIELD ON THE CONDENSATION OF VAPOR.
Rept. for Sep 62-Aug 63,
by Henry R. Velkoff and John H. Miller. Feb 64, 55p.
Proj. 3084, Task 308404
RTD TDR63 4008 Unclassified report

Report on Propulsion Fluid and Heat Transfer Subsystems.

Descriptors: (*Electrostatic fields, Vapors), (*Condensation, Analysis), Heat transfer coefficients, Measurement, Tests, Electrodes, Copper, Metal plates, Tanks (Containers), Air, Nitrogen, Oxygen, Electrical corona.

An experimental program was conducted to determine whether electrostatic fields could be applied effectively to iincrease the heat transfer coefficient in the condensation of vapor. A series of tests using several types of electrodes and various field strengths was conducted to study the effects of various electrostatic actions on the condensation process. In these tests, Freon-113 was vaporized in a tank and condensed on a cooled copper plate. Results of these tests indicate that large increases in heat transfer coefficient can be realized by applying an electrostatic field with a screen electrode placed parallel to a cooled copper plate. The increases were controllalble and readily reproduced. (Author)

AD-433 245 Div. 25
OTS price $4.60

Plesset, E. H. Associates Inc., Los Angeles, Calif.
NON-RELATIVISTIC COLLISION THEORY ELEMENTARY COLLISION PROCESSES IN THE HIGH ATMOSPHERE,
by Edward Gerjuoy. 1 Nov 61, 45p. Rept. no. 35006
Contract AF29 601 4335
Unclassified report

Descriptors: (*Solar disturbances, Elastic scattering), (*Upper atmosphere, Charged particles), (*Quantum mechanics, Relativity theory), Theory, Protons, Ionization, Hydrogen, Aurorae, Magnetic storms, Electron

capture, Electron bombardment, Energy, Electrons, Ions.

Many high-atmosphere phenomena - for example, the collision electron density in the E layer - depend on collision rates which are not readily measurable in the laboratory. A number of such collision processes are listed and the presently available theoretical procedures for estimating their rates are briefly reviewed. (Author)

AD-433 256 Div. 25
OTS price $9.10

Plesset, E. H. Associates, Inc., Los Angeles, Calif.
NON-RELATIVISTIC COLLISION THEORY II - CLASSICAL AND QUANTUM CROSS SECTIONS,
by Edward Gerjuoy. 1 Oct 61, 109p. Rept. no. C35 61U5, TR120
Contract AF29 601 4335
Unclassified report

Descriptors: (*Differential cross section, Quantum mechanics), (*Quantum mechanics, Differential cross section), Nuclear scattering, Scattering, Velocity, Charged particles, Potential scattering.

AD-433 257 Div. 25
OTS price $10.50

Plesset, E H, Associates Inc, Los Angeles, Calif.
NON-RELATIVISTIC COLLISION THEORY. I. REVIEW OF CONVENTIONAL POTENTIAL SCATTERING THEORY ONE-DIMENSIONAL PROBLEMS,
by Edward Gerjuoy. 1 July 62, 139p. Rept. no. C35 61U3TR116
Contract AF29 601 4335
Unclassified report

Descriptors: (*Scattering, Theory), Nuclear scattering, Potential scattering, Boundary value problems, Quantum mechanics.

AD-433 263 Div. 25
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
STRESS CONCENTRATION FACTORS FOR SEMIELLIPTICAL NOTCHES IN BEAMS UNDER PURE BENDING,
by C. H. Tsao, A. Ching, and S. Okubo. 25 Oct 63, 36p. Rept. no. TDR169 3230 11TN16
Contract AF04 695 169
SSD TDR63 411 Unclassified report

Descriptors: (*Beams (Structural), Deformation), (*Stresses, Photographic analysis), Creep, Tests, Photoelasticity, Tensile properties, Loading (Mechanics), Compressive properties.

Elliptical notches in rectangular beams under pure bending are examined photoelastically. Stress concentration factors due to a single elliptical notch are obtained for wide ranges of 2a/h and d/h, wher 2a, d, and h are the width of notch, depth of notch, and depth of beam, respectively. In particular, the geometries of the optimum elliptical notches producing the least stress concentrations are obtained. Almost the whole elliptical boundary of these notches are stressed to the same peak, which indicates that these notches will probably produce the least stress concentrations among all notches, elliptical or nonelliptical. The graphs will enable the designers to find the stress concentration factors of elliptical notches and to pick out the geometry of the optimum notch which will give the least stress concentration for any given values of 2a/h and d/h. Stresses and the stress concentration factors at the bottom of the beam opposite the notch are also obtained. These stresses, though smaller in magnitude, are of an opposite sign to the peak stress at the notch. For brittle materials a smaller tensile stress may be more critical than a large compressive stress; therefore, these stress concentration factors are also given. (Author)

AD-433 282 Div. 25
OTS price $2.60

Raytheon Co., Waltham, Mass.
MULTIMODE OSCILLATIONS IN SOLID STATE MASERS.
Interim scientific rept.,
by H. Statz and C. Tang. Oct 63, 29p. Rept. no. S595
Contract AF19 628 3226, Proj. 4645, Task 464502
AFCRL 63 917 Unclassified report

Descriptors: (*Lasers, Solid state physics), (*Oscillation, Multiple operation), Excitation, Relaxation oscillators, Crystals, Refractive index, Damping, Ions.

Previous work on the effects of slow spatial cross relaxation is extended in two directions. First, off-axis models are included in the calculations, and it becomes possible to calculate the number of oscillating off-axis modes as a function of the various laser parameters. The expected beam angle of a laser can be predicted. Second, a more detailed analysis of the spiking behavior is given. Both regular and irregular spiking trains may be obtained, depending upon the laser parameters and pump power. (Author)

26. PRODUCTION AND MANAGEMENT

AD-431 505 Div. 26, 17
OTS price $2.60

McDonnell Aircraft Corp., St. Louis, Mo.
MACHINABILITY OF H-11 STEEL IN THE AS-FORGED AND HEAT TREATED CONDITIONS.
Final rept.,
by I. A. D. Mares. 10 Mar 64, 27p. Rept. no. A463
Contract AF33 657 11215
Unclassified report

Descriptors: (*Tool steel, Machining), (*Material removal, Tool steel), Milling machines, Cutting tools, Heat treatment, Chromium alloys, Molybdenum alloys, Chemical analysis, Surface properties, Carbide tools.

The Systems Laboratory of McDonnell Aircraft Corporation conducted producibility tests on machining large H-11 steel parts. This material is readily heat treated to strength levels in the 220,000 to 240,000 psi level so machinability tests were conducted on H-11 steel in both the annealed and heat treated conditions. One test specimen was machined to finished shape, then tested to determine the extent of fixturing necessary to prevent distortion during heat treatment. The test results showed H-11 steel to be readily machinable in the annealed conditions, and well adapted to heat treatment in existing facilities, if properly supported by strain relief fixturing. While H-11 steel can be machined in the heat treated conditions, tool life and metal removal rates are very poor. (Author)

AD-431 506 Div. 26, 17
OTS price $1.60

McDonnell Aircraft Corp., St. Louis, Mo.
OVERLAP, CLEARANCE AND SPECIMEN WIDTH OF BRAZED PH15-7Mo JOINTS.
Final rept.,
by Frank Coffey. 10 Mar 64, 20p. Rept. no. A465
Contract AF33 657 11215
Unclassified report

Descriptors: (*Stainless steel, Brazing), (*Soldered joints, Shear stresses), Sheets, Silver solders, Metal joints, Cleaning, Heat treatment.

Tests were conducted to evaluate the shear strength of brazed joints with thin sheets of base metal, and to determine the shear strength variation as caused by joint clearance and length of overlap. PH 15-7 Mo stainless steel was selected as the base metal, and Lithobraze 925 as the braze alloy. At minimum joint clearance, an increase in overlap caused a reduction in the shear strength, determined at both room temperature and at 800F. The maximum shear strength developed at room temperature (20,700 psi) resulted from a 5t overlap; the maximum developed at 800F resulted from a 3t overlap. The effect of joint clearance was not determined due to the severe surface contamination encountered on all exposed PH 15-7 Mo surfaces. Since the braze alloy flow and filleting on the exposed base metal surfaces were unsatisfactory, testing was discontinued. (Author)

AD-431 510 Div. 26
OTS price $2.60

McDonnell Aircraft Corp., St. Louis, Mo.
THE DEVELOPMENT OF ELECTROFORMING TECHNIQUES FOR WIND TUNNEL MODELS.
Final rept.
by E. W. Wiggins. 10 Mar 64, 27p. Rept. no. A479
Contract AF33 657 11215
Unclassified report

Descriptors: (*Electroforming, Wind tunnel models), (*Wind tunnel models, Electroforming), (*Manufacturing methods, Wind tunnel models), Mechanical properties, Machining, Weight, Thermodynamics, Electrodeposition, Physical properties, Nickel, Tensile properties, Configuration, Failure.

Techniques of electroforming aerodynamically smooth, light-weight, thin-skinned, improved dynamic and thermodynamic response wind tunnel models were investigated. Two methods of controlling skin thickness and dimensional tolerance of the finished models were investigated. The first method entailed final contour machining, while the second utilized current distribution aids to control the tolerances. The latter method showed promise of reducing machining costs by controlling the electro-deposited metal distribution; however, a complete model was never made due to the low priority and cancellation of this test request. Mechanical properties tests and metallographic studies of the electroformed metal were made. The results showed that the electroformed nickel deposit had an average room temperature ultimate tensile strength of 132,750 psi and an average elongation of 5%. The metallographic studies showed that the physical properties could be improved by elimination of solids contamination from the electroforming bath. The solids contamination was shown to be responsible for crystalline discontinuities within the metal structure, producing cleavage planes and reducing the effective cross-section of the tensile specimens. (Author)

AD-431 602 Div. 26, 17
OTS price $5.60

McDonnell Aircraft Corp., St. Louis, Mo.
ELECTROCHEMICAL DEBURRING OF MOLYBDENUM, ALUMINUM AND STAINLESS STEEL.
Final rept.,
by James E. Woolf. 10 Mar 64, 54p. Rept. no. A478
Contract AF33 657 11215
Unclassified report

Descriptors: (*Metals, Material removal), (*Material removal, Electrochemistry), Chemical milling, Electrolytic polishing, Molybdenum, Aluminum alloys, Stainless steel, Solutions, Alcohols, Chromic acids, Nitric acid, Sulfuric acid, Fluorine compounds, Acids.

Sharp edges left after chemical milling and blanking are presently being mechanically removed at high cost. The sharp edges would be areas of high current density in electrochemical operations and could be easily removed in electrochemica l solutions. The criteria of a good electrochemical deburring solution were leveling characteristics and removal rate. Various solutions were evaluated for breaking sharp edges on molybdenum, among them being 25% by weight nitric acid, nitric-hydrofluoric acid solution for milling molybdenum and variations of Turco 105 steel etchant. These solutions were successful in a leveling action on sharp burrs, but would not round the side edges. A combination of nitric acid leveling and side edge burnishing produced the most

promising results. Aluminum and stainless steel deburring was evaluated in proprietary solutions, with good results obtained in polishing and breaking of sharp edges. (Author)

AD-431 620 Div. 26, 17
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
EVALUATION OF TUNGSTEN SURFACE FINISH PRODUCED BY ELOX AND ANOCUT MACHINING TECHNIQUES,
by George Filators. 10 Mar 64, 10p. Rept. no. A477
Contract AF33 657 11215
Unclassified report

Descriptors: (*Tungsten, Machining), (*Machining, Tungsten), Metallography, Sheets, Rods, Cutting tools, Surfaces.

Tests were conducted in which tungsten bar and sheet material was cut with Elox equipment using several electrode materials and power settings. A piece of tungsten sheet machined on an Anocut setup was also included. The purpose of this work was to evaluate metallographically the surface finish and condition of the tungsten cut by the various procedures. (Author)

AD-431 621 Div. 26, 12, 17
OTS price $.75

McDonnell Aircraft Corp., St. Louis, Mo.
ABLATION SHIELD DEVELOPMENT TESTING - SURFACE PREPARATION OF BERYLLIUM FOR ADHESIVE BONDING.
Final rept.,
by Henry E. Ruling. 10 Mar 64, 25p. Rept. no. A471
Contract AF33 657 11215
Unclassified report

Descriptors: (*Spacecraft, Heat shields), (*Heat shields, Reentry vehicles), (*Panels (Structural), Beryllium), (*Manufacturing methods, Panels (Structural), Ablation, Adhesives, Bonding, Surfaces, Preparation.

Design studies conducted in an effort to reduce the weight of space vehicle component parts and in order to extend the mission capabilities of space vehicles have resulted in a proposed re-entry shield considerably lighter than those presently used. Such a shield, consisting of an ablation material bonded to a beryllium back up structure, has been proposed for the re-entry shielding of space vehicle. A four phase development program was initiated to determine the optimum materials and fabrication techniques required to fabricate the proposed re-entry shield. It was the purpose of this phase of the development program to evaluate various methods of preparing beryllium surfaces for adhesive bonding. (Author)

AD-431 622 Div. 26, 17
OTS price $3.60

McDonnell Aircraft Corp., St. Louis, Mo.
EVALUATION OF THE DELTA TITANIUM - CADMIUM PLATING PROCESS.
Final rept.,
by M. W. Meyer. 10 Mar 64, 35p. Rept. no. A464
Contract AF33 657 11215
Unclassified report

Descriptors: (*Cadmium, Plating), (*Titanium, Plating), (*Steel, Hydrogen embrittlement), Electro deposition, Electroplating, Protective treatments, Metal coatings, Corrosion inhibition, Salt spray tests, Heat treatment, Thickness, Time, Tensile properties.

Effort was made to evaluate the Delta Titanium-Cadmium plating process with respect to its operating characteristics and ability to reduce or eliminate hydrogen embrittlement problems inherent with electroplated high strength steels. In addition to this, the corrosion resistance of the Delta titanium-cadmium plate was evaluated and compared to cadmium plate from a standard cadmium cyanide bath. The results of the evaluation of the operating characteristics of the new bath showed that it had a 100% anode efficiency and a mean cathode efficiency of 94.6% over a current density range of 20 to 30 amperes per square foot. Hydrogen embrittlement evaluation utilizing static fatigue notch tensile specimens showed that embrittlement did occur in high strength (300 KSI) steel, however, this could be relieved to some extent by baking the specimens at 375F for 24 hours. The corrosion tests were inconclusive. (Author)

AD-431 758 Div. 26, 8, 30
OTS price $1.60

Keystone Electronics Co., Newark, N. J.
CRYSTAL UNIT (CR - XM-30)/U.
Quarterly progress rept., Apr-June 63,
by James M. Ronan. June 63, 20p.
Contract DA36 039sc85940
Unclassified report

Descriptors: (*Crystal holders, Production), (*Manufacturing methods, Design), Glass, Analysis, Quality control, Test equipment (Electronics), Test facilities, Operation.

Continuing problems associated with the supply of Crystal Holders, HC-(XM-4)/U, are reported, as well as efforts to improve operation of the prototype limited production equipment. (Author)

AD-431 830 Div. 26, 4
OTS price $15.50

Redstone Scientific Information Center,
Redstone Arsenal, Ala.
MANUFACTURING PROCESSES FOR LIQUID HYDROGEN,
by Gus J. Caras. Oct 63, 233p.
RSIC 84 Unclassified report

Descriptors: (*Hydrogen, Liquefied gases), (*Liquefied gases, Hydrogen), (*Bibliographies, Liquefied gases), (* Cryogenics, Hydrogen), Abstracts, Production, Handling, Storage, Processing, Industrial equipment, Industrial production, Industrial plants, Manufacturing methods, Instrumentation.

This report was prepared for the Marshall Space Flight Center, NASA, Huntsville, Alabama; consequently, it includes only the information requested. The data pertain to manufacturing and handling processes and equipment necessary for the production and handling of liquid hydrogen. The first part summarizes various processes commonly employed for production and purification of gaseous hydrogen, liquefaction cycles, conversion of ortho-hydrogen to para-hydrogen, methods of storage and transfer, and some of the equipment associated with these processes. The major liquid hydrogen producing plants are described, and process flow charts for most plants are given. The second part of this report is an annotated bibliography containing 443 references written on this subject from 1958 to 1963. The bibliography is divided into several sections according to subject, and is followed by an appendix which includes personal author, corporate source, and report number indexes. (Author)

AD-431 856 Div. 26, 17
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
ELEVATED TEMPERATURE TESTS OF CHROMIUM - TITANIUM - SILICON COATED F48 COLUMBIUM ALLOY BOLT AND NUT,
by Robert R. Wilcox. 10 Mar 64, 8p. Rept. no. A474
Contract AF33 657 11215
Unclassified report

Descriptors: (*Bolts, Niobium alloys), (*Locking fastener devices, Niobium alloys), High temperature research, Coatings, Chromium, Titanium, Silicon, Metallography, Vapor plating, Microstructure, Photomicrography.

A F-48 Columbium alloy bolt and nut was subjected to four 1/2 hour cycles of exposure to 2500F and cooled to room temperature. Prior to, and after each exposure the bolt and nut was weighed to .0001 grams and the weight gain determined. Following thermal cycling the bolt and nut was cross sectioned and metallographically examined, photographed, and coating thickness measured on the bolt shank and thread areas. Metallographic examination showed an equiaxed grain structure, resulting from recrystallization. Recrystallization began to replace the wrought structure, characteristic of the bolt before thermal cycling. Visual examination of the bolt and nut after the temperature exposures exhibited blemishes of chromium oxides on both bolt and nut. (Author)

AD-431 863 Div. 26, 17
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
DETERMINATION OF RESISTANCE WELDABILITY OF TZM MOLYBDENUM ALLOY THIN SHEET,
by Robert R. Wilcox. 10 Mar 64, 6p. Rept. no. A475
Contract AF33 657 11215
Unclassified report

Descriptors: (*Welds, Metallography), (*Resistance welding, Molybdenum alloys), (*Molybdenum alloys, Resistance welding), Sheets, Fracture (Mechanics).

Two resistance-welded test strips of TZM molybdenum alloy (each containing several welds) were subjected to metallographic examination. Each weld was cross sectioned and prepared metallographically and photomicrographed at 50 magnifications. These limited tests show that resistance spot welds in TZM molybdenum alloy cannot be consistently made without frequent cracking occurring in and around the nugget. (Author)

AD-431 897 Div. 26, 17
OTS price $22.25

Westinghouse Electric Corp., Pittsburgh, Pa.
DEVELOPMENT OF A STEEL, WELD METAL, AND WELDING PROCEDURE CAPABLE OF PRODUCING 150,000 PSI YIELD STRENGTH IN HEAVY SECTIONS.
Final rept., 20 Jun 60-30 Jun 62,
by J. Heuschkel, G. E. Grotke, L. E. Hays, T. F. Hengstenbery and F. C. Hull. Rept. no. 62 949 307 R1
Contract NObs78823, Proj. S R 007 01 01
Unclassified report

Descriptors: (*Steel, Structural parts), (*Structural parts, Manufacturing methods), Welding o s, Toughness, Transition temperature, Tensile properties, Impact shock, Fracture (Mechanics), Arc welding, Manganese alloys, Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Grain structure (Metallurgy), Hardness, Brittleness, Microstructure, Metallography.

AD-431 958 Div. 26, 17
OTS price $1.10

General Electric Co., Schenectady, N. Y.
AN INVESTIGATION OF THE NATURE OF STRUCTURAL DAMAGE IN METAL-FORMING PROCESSES.
Progress rept. no. 4, 18 Dec 63-17 Feb 64,
by R. C. Leech, L. F. Coffin, Jr. and H. C. Rogers. Feb 64, 2p.
Contract Now63 0671C
Unclassified report

Descriptors: (*Metals, Material forming), (*Copper, Drawing (Machine processing), Sheets, Wire, Deformation, Strain gages, Loading (Mechanics), Deflection, Dies, Instrumentation, Calibration.

Strain gages were applied to the sheet-drawing die holder and to the tension ''weighbars,'' and the load-deflection characteristics of each of these units was established through calibrating procedures utilizing a tensile testing machine. Instrumentation had to be assembed for this purpose, and some trouble was encountered, but finally overcome, in phase balacing the measuring circuits in the alternating-current bridge network system. Manufacture was completed on the calibrating wedge accessory by which magnified separating forces could be induced in the die holder ring, and this accessory was utilized for the high-load calibrations. Its results matched nicely with the low-load direct calibrations, and demonstrated a mechanical hysteresis of only approximately ±1%. (Author)

AD-431 961 Div. 26
OTS price $3.60

Springfield Armory, Mass.
DESIGN ANALYSIS OF BELLEVILLE WASHER SPRINGS,
by H. P. Swieskowski. 30 Apr 63, 31p.
SA TR15 1104 Unclassified report

Descriptors: (*Gaskets, Locking fastner devices), (*Locking fastener devices, Mathematical analysis), Stresses, Springs, Design, Series, Thickness, Elasticity, Multiple operation, Equations, Mechanical properties.

A theoretical study was made to obtain data to establish an analytical method for the design of Belleville washers for energy storage and to modify the conventional formulas to replace the dependent variables with the independent or known values. These modified formulas were subsequently used to establish the stress reduction of a nested spring system and to determine an optim stacking attangement. A simplified and direct method for the design of washers for energy capacity was established. Final working stress is proportional to the square root of the energy requirement, and is inversely proportional to the outside diameter and the square root of the solid height. The study further shows that the final stress is at a minimum when the diameter ratio A = OD/ID equals 1.7. The one-parallel series of the stacking arrangements considered is the most efficient for energy storage. Detailed derivations are shown and results discussed. (Author)

Division 26 - PRODUCTION AND MANAGEMENT

AD-432 043 Div. 26, 17
OTS price $.75

Rock Island Arsenal Lab., Ill.
EVALUATION OF THE RADIOMETRIC METHOD OF TOOL WEAR DETERMINATION,
by G. F. Wilson. 31 Oct 63, 23p.
Projs. 466FY62, 4230 1 6017 30 01
RIAL 63 3598 Unclassified report

Descriptors: (*Cutting tools, Wear resistance), (*Radiometers, Test methods), Cutting fluids, Velocity, Determination, Material removal, Radioactive isotopes, Visual inspection, Lathes, Machining, Carbide tools.

A radiometric method of tool wear determination was investigated and evaluated. The effects of variables such as cutting fluids, cutting speeds and the use of a single cutting edge for one or more than one cutting condition were studied. Results obtained visually and radiometrically were compared. Good correlation existed between volumetric wear rates obtained by both methods. The radiometric method does not give information on the nature of the tool wear geometry. Differences in volumetric wear rate were found when only one cutting edge was used for a variable as compared to a single cutting edge used for more than one variable. (Author)

AD-432 098 Div. 26, 30
OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
RESEARCH ON COMPUTER AUGMENTED INFORMATION MANAGEMENT,
by Charles P. Bourne. Nov 63, 59p.
Contract AF19 628 2914, SRI Proj. 4506
ESD TDR64 177 Unclassified report

Descriptors: (*Information retrieval, Management engineering), (*Management engineering, Computers), Operation, Input-output devices, Magnetic tape.

The work reported was concerned primarily with the design and development of an information-management subsystem that would operate in the environment of a cooperative man/computer system for the production of operating computer programs. An experimental system was developed which utilized the AN/FSQ-32 computer in a time-sharing mode of operation, as well as a cathode ray tube display and associated input-output facilities for real-time machine use by a programmer. A number of symbol manipulation techniques (e.g., insert, delete) developed on the ARPA project were used for the editing and manipulation of text and programming material on the display. Methods of file organization were studied and established for the machine file. Procedures were established for obtaining and using machine-readable records from all of the project records (e.g., memos, correspondence, bibliographies, reports) generated by the user group, to serve as the basis for an experimental machine file. This machine file was established, along with appropriate file search routines, to permit the reading of the natural text of the file material. Studies were made of methods to automatically determine alternate search prescriptions, and display these to the inquiror. Procedures were established to perform some copy editing of the text material (e.g., check for correct spelling). (Author)

AD-432 235 Div. 26, 17
OTS price $2.60

Army Frankford Arsenal, Philadelphia, Pa.
SLIP CASTING OF COPPER POWDER,
by H. V. Sulinski. Jan 64, 28p.
DA Proj. 1A0 24401A11
AFA R1705 Unclassified report

Descriptors: (*Powder metals, Material forming), (*Material forming, Casting), (*Copper, Powder metallurgy), Particle size, Sintering, Vibration, Tensile properties, Density, Viscosity, pH, Water, Sodium compounds, Alginic acid, Molding materials, Molding.

It has been demonstrated that copper powder can be slip-cast using sodium alginate as a deflocculant binder and water as a liquid vehicle. The results show that spherically shaped powder is better than irregularly shaped powder for the production of copper slip castings. The viscosity of a copper slip is related to its pH value and exhibits a minimum in the normal pH range. Samples exposed to various thermal cycles in a dissociated ammonia atmosphere showed that the density of slip-cast copper powder increases with increasing sintering time and temperature. Lowering the water: metal ratio increases the viscosity; the as-dried strength, as-dried density and sintered density; and decreases the shrinkage of castings. Vibration has a slightly beneficial effect on the properties of a copper casting. (Author)

AD-432 313 Div. 26
OTS price $1.25

Meier' Vincent', Port Washington, N. Y.
DESICCATING BARRIERS FOR MILITARY PACKAGING.
1 NOVEMBER 1963,
Final technical rept., 1 Nov 62-1 Nov 63.
1 Nov 63, 48p. Rept. no. PO7 6253
Contract NOw63 0155c
Unclassified report

Descriptors: (*Packing materials, Military requirements), (*Desiccants, Packing materials), Films, Transparent panels, Controlled atmospheres, Specifications, Corrosion inhibition, Seals (Stoppers), Stability, Toxicity, Costs, Hygrometers, Optical properties, Mechanical properties.

This report covers work performed during a one year period of the contract. A study was made to develop new and superior packaging systems and materials capable of producing a dehumidified or moisture controlled atmosphere similar to that presently produced at a lower cost and greater efficiency. Three fundamental approaches were examined in detail The method showing greatest promise of meeting all the design targets consists of a two part barrier system, one opaque and the other transparent. (Author)

AD-432 316 Div. 26, 17
OTS price $1.00

NARMCO Industries, Inc., San Diego, Calif.
THE INVESTIGATION OF EXOTHERMIC BRAZING OF REFRACTORY ALLOYS.
Final technical rept. 1 Nov 62-31 Oct 63,
by Roger A. Long and Ray Williams. Dec 63, 37p.
Contract N600 19 59237
Unclassified report

Descriptors: (*Refractory metals and alloys, Thermal joining), (*Thermal joining, Brazing), Soldering alloys, Manganese alloys, Nickel alloys, Heat, Chemical reactions, Fluxes (Fusion), Ceramic materials.

Three different concepts for brazing refractory metals utilizing exothermic reactions were investigated. These concepts included (1) an external exotherm heat source used to produce a joint with

a standard braze alloy, (2) exothermic reactions (internal exotherms) whose reaction products include a metal phase which serves as the braze alloy, and (3) an external exotherm heat source used to produce a joint by means of a fluxing ceramic phase. Some studies resulted in exotherms that yeilded a satisfactory nickel-maganese braze alloy; however, reactions designed to yield a more refractory alloy (liquidus in excess of 3000 F) were not sucessful. Exothermic reactions (external) which act as heat sources were successful in producing high-strength brazed joints with all the refractory metals when using commercially available braze alloys with flow temperature up to 3100 F. Minimum damage to base metal properties, due to the short-time period of brazing, was evidenced. The feasibility of using a boron donor compound to produce an in-situ braze alloy with the base metal was proven. (Author)

AD-432 465 Div. 26
OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
SOME CONSIDERATIONS ON PARTS, MATERIALS AND PROCESS ENGINEERING FOR MILITARY SYSTEMS,
by Douglas O. Heitkamp. 23 Jan 64, 20p. Rept. no. TDR269 4303 9
Contract AF04 695 269
SSD TDR64 3 Unclassified report

Descriptors: (*Armed forces procurement, Specifications), Reliability, Quality control.

AD-432 466 Div. 26, 8
OTS price $1.60

Texas Instruments Inc., Dallas.
PRODUCTION ENGINEERING MEASURES TRANSISTOR RELIABILITY.
Quarterly progress rept. no. 5, 1 May-31 July 63. 31 July 63, 12p.
Contract DA36 093sc86730
Unclassified report

Descriptors: (*Transistors, Production), Reliability (Electronics), Germanium, Failure (Mechanics), Bonding, Scheduling, Epitaxial growth, Coatings, Cleaning, Manufacturing methods.

AD-432 808 Div. 26, 17, 25
OTS price $6.60

Battelle Memorial Inst., Columbus, Ohio.
PLASMA WELDING AND CLEANING,
by H. E. Pattee, M. D. Randall and D. C. Martin. 24 Feb 64, 69p.
Contract DA01 021AMC203Z
RSIC123 Unclassified report

Descriptors: (*Plasma jets, Thermal joining), (*Welding, Plasma jets), (*Cleaning, Plasma jets), Metals, Aluminum alloys, Gases, Shielding, Argon, Helium, Electrical properties, Mechanical properties, Welds, Porosity, Hydrogen, Metal coatings, Polarization, Bibliographies, Reviews, Plasma physics, Plasma sheath, Electric arcs.

Plasma technology, as it applies to joining metals, is reviewed and the current status of both welding and cathodic cleaning of metals by plasma arc procedures is summarized. In order to produce defect-free welds, with high joint efficiencies in aluminum alloys by TIG welding procedures, very slow welding speeds, or specialized methods, must be used. Although application of the plasma arc to joining metals is still largely in the development stage, it appears to be an attractive welding process. The plasma arc is constricted whereas the TIG arc is unconfined. Because of the constriction, higher temperatures are available in the plasma arc. Thus, substantially higher welding speeds can be achieved than with the TIG process. Furthermore, the plasma arc characteristics are not as sensitive to minor variations in the process variables. The effectiveness of cathodic cleaning has been demonstrated by surface resistivity measurements. (Author)

AD-432 900 Div. 26, 2, 1
OTS price $1.60

Kaysam Corp. of America, Patterson, N. J.
PRODUCTION ENGINEERING MEASURE FOR MANUFACTURE OF METEOROLOGICAL BALLOONS TYPE ML-541( )/UM.
Quarterly progress rept. no. 7, 19 Oct 63-18 Jan 64,
by Murray Miner and John Kantor. Jan 64, 16p.
Contract DA36 039sc85988
Unclassified report

Descriptors: (*Meteorological balloons, Manufacturing methods), Machines, Rubber, Industrial equipment, Processing.

The head balloon dipping machine is complete and has a capability for full production. The design of the tail balloon dipping machine is complete, and construction of the spoked wheel assembly and tanks is underway. The design of the balloon assembly machine is complete, and construction of all fabricated components has been initiated. The superstructure, track, chain, and drive of the conveyorized drying system is installed and operating. Investigations of various inflation arms are being conducted to determine an economical and safe inflation and deflation method. All head and tail balloon dipping forms were cast and vinyl coated. Twenty-eight preproduction samples were resubmitted for flight tests. (Author)

AD-432 979 Div. 26, 31, 27
OTS price $17.50

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Final rept., Apr 60-Feb 63.
6 Dec 63, 279p. Rept. no. AL63L023
Contract NObs78552, Proj. V3
Unclassified report

Descriptors: (*Roller bearings, Vibration), (*Vibration, Bearings), (*Ball bearings, Vibration), Test equipment, Noise, Loading (Mechanics), Theory, Rotation, Mathematical analysis, Test methods, Tests.

27. PROPULSION SYSTEMS

AD-431 295 Div. 27, 12
OTS price $5.60

Rocketdyne, Canoga Park, Calif.
PERFORMANCE DATA FOR INDIVIDUAL ATLAS MA-2 AND MA-5 ENGINES.
28 Feb 64, 54p. Rept. no. 5108 2
Contract AF04 695 306
Unclassified report

Descriptors: (*Rocket motors (Liquid propellant),Acceptability), Guided missiles (Surface-to-surface), Booster motors, Sustainer motors, Performance (Engineering), Interior ballistics, Thrust, Specific impulse, Captive tests, Programming (Computers), Turbopumps, Velocity, Vernier rocket motors, Cryogenics, Oxygen, Time.

Contents: Data Reduction Computer Programs; Performance Data (Booster, Sustainer, Vernier, MA-2 Engines, and MA-5 Engines); Minimum Sustainer LOX Net Positive Suction Head, (Sustainer LOX Pump Configuration); and Sustainer Engine Duration.

AD-431 561 Div. 27, 17, 26
OTS price $1.60

Alpha Div., Thiokol Chemical Corp., Huntsville, Ala.
ARMY MATERIALS RESEARCH AGENCY PROGRAM. CASE EVALUATION.
Quarterly interim technical rept., 22 Mar-21 June 63.
27 Feb 64, 16p. Rept. no. 10 64
Contract DA01 021ORD11919
Unclassified report

Descriptors: (*Rocket cases, Captive tests), Rocket motors (Solid propellant), Hydrostatic pressure, Stresses.

The objective of this program is to evaluate experimental rocket motor cases produced under the Army Materials Research Agency Program. This report gives the accomplishments during the fourth quarter. It describes the testing of six Borg-Warner helically wrapped cases incorporated into modified Thiokol M60 rocket motors. Three of the motors were hydrostatically tested and three were statically tested. The results of the tests resulted in the recommendations that the Borg-Warner helically wrapped case be improved by a closer and more constant gap through all fine layers of material. The case concept shows advantages toward the development of a strong lightweight case. (Author)

AD-431 569 Div. 27, 25, 10, 9
OTS price $5.60

United Technology Corp., Sunnyvale, Calif.
DYNAMICS OF TWO-PHASE FLOW IN ROCKET NOZZLES.
Quarterly technical progress rept. no. 11, 1 Nov 63-31 Jan 64,
by C. T. Crowe, R. W. Woolfolk, R. Dunlap, R. W. Hermsen and P. G. Willoughby. 27 Feb 64, 52p.
Rept. no. 2005QT11
Contract NOw61 0750c
Unclassified report

Descriptors: (*Rocket motor nozzles, Phase studies). (*Nozzle gas flow, Phase studies). Solid rocket propellants, Particles, Drag, Tracking, Two-dimensional studies, Reaction kinetics, Nucleation, Aluminum compounds, Oxides, Growth, Turbulence, Pressure, Performance (Engineering), Specific impulse, Metals, Combustion, Rocket motors (Solid propellant)

An experimental and theoretical investigation was made of the axial and radial velocity lag of a dispersed solid phase in accelerating gases. The program objective is to generate basic information and nozzle design criteria for two-phase flow resulting from the combustion of metallized solid propellants. Development continued of the experimental apparatus to measure particle drag coefficients in the regimes of particle Mach numbers 2 and Reynolds numbers 1000. Fabrication of the particle acceleration section is near completion and the design of the associated electronic equipment was completed. More refined calculations have verified the feasibility of tracking a small particle by detecting, photoelectrically, the light reflected from its surface as it moves along a beam of intense light. Design of a tracking section utilizing this tracking technique is proceeding. Pressure distribution measurements were continued on the two-dimensional nozzle with pure gas flow in preparation for measurements with gas-particle flow. (Author)

AD-431 605 Div. 27, 31, 8
OTS price $3.00

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
THEORETICAL INVESTIGATION OF AN INDUCTION COMPRESSOR.
Final rept.,
by Joseph L. Neuringer, Eugene Migotsky, Robert M Haag, and James H. Turner. 1 Mar 64, 179p.
TR63 51
Contract Nonr4047
Unclassified report

Descriptors: (*Jet propulsion, Underwater propulsion), (*Underwater propulsion, Jet propulsion), (*Electromechanical converters, Jet propulsion), Magnetic fields, Coils, Pipes, Mathematical analysis, Fluid flow, Pumps, Electric current, Hydrodynamics, Submarines, Torpedoes, Liquid metals, Theory.

The operation of a peristaltic magneto-fluid dynamic induction compressor has been studied theoretically and the specialization of such a compressor to underwater propulsion has been suggested. The principles of operation involves using a sinusoidal current sheet traveling on a coil to drive a highly conductive fluid in an annulus within the coil, mechanically coupling the resultant forces to a less conductive fluid in another annulus within the first, and deriving thrust from the pressure rise thus generated in the less conductive fluid. The study assumes efficient mechanical coupling between the fluids by a flexible diaphragm, low joulean losses in the conducting fluid, and negligible flow separation losses between the accelerated fluid and medium. The study concludes that induction compressors could propel submarines and torpedoes with very high efficiency and could be developed for a variety of other applications. (Author)

AD-431 636 Div. 27, 10
OTS price $6.60

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
INFLUENCE OF IONS ON ROCKET COMBUSTION.
Final rept., 1 Mar 58-21 Mar 63,
by T. H. Dimmock. 21 Mar 63, 63p.
Contract AF49 638 305, Proj. 42205 204
AFOSR 5493 Unclassified report

Descriptors: (*Rocket motors, Exhaust gases), (*Exhaust gases, Ionization), Combustion, Plasma jets, Rocket propellants, Additives, Temperature, Pressure, Thermal conductivity,

Supersonic flow, Relaxation time, Differential equation, Chemical equilibrium, Thermodynamics, Performance (Engineering), Combustion products, Frozen equilibrium flow, Shifting equilibrium flow, Test equipment, Phase studies.

The ionization profile along the axis of a seeded, Mach 3, high altitude rocket exhaust was mapped by microwave and probe techniques. The relaxation in the jet was evaluated from the measured data. Since the ionization was found to follow the gas density profile, it was concluded that the relaxation time was at least as long as the transit time between the shock waves, and that the residence time in the shock zone was sufficient to sustain this ionization. Cases in which the residence time is less than the thermalizing time are also illustrated. The thermodynamic properties in the jet were measured by pressure and temperature probes and by line reversal spectroscopy. Unfortunately it was necessary for the probe dimensions to be comparable to the jet dimensions, thus the excursions in pressure and temperature along the profile were reduced and results are average values only. The microwave method was found to be suitable for analysis of low pressure seeded jets as long as the collosion frequency is of the order of 10-one manosecond and the electron density lies between 5 x 10 to the 11th power and 2 x 10 to the 13th power electrons/Cu Cm. (Author)

AD-431 841 Div. 27
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
STUDY OF STATION KEEPING USING LOW THRUST (ION) ENGINES,
by R. V. Soufl. 8 Jan 64, 38p. Rept. no. TDR269 4504 20 1
Contract AF04 695 269
SSD TDR63 374 Unclassified report

Descriptors: (*Satellites (Artificial), Orbital trajectories), (*Orbital trajectories, Control systems), (*Ion engines, Satellites (Artificial)), Command guidance, Command and control systems, Motion, Synchronous satellites, Position finding, Mathematical analysis, Theory, Altitude control systems.

The problem of using low thrust engines to control the position, period and eccentricity of a satellite's orbit is examined. Equations describing the motion of a satellite in response to constant low level radial and tangential thrusting are developed. A guidance logic for control of the position and period is developed using phase plane techniques. A logic for control of eccentricity is also presented. The problem of orbit determination is also considered. Expressions relating period and position uncertainties as a function of the nominal orbit parameters, tracking errors and tracking time are developed. (Author)

AD-432 133 Div. 27, 26
OTS price $9.60

Massachusetts Inst. of Tech., Cambridge.
BASIC RESEARCH AND DEVELOPMENT IN FLUID JET MODULATORS FOR TURBOPROPULSION SYSTEM CONTROL FOR THE UNITED STATES AIR FORCE.
Rept. for 1 Apr 62-31 Mar 63,
by K. N. Reid, R. J. Gurski, W. B. Bails, and F. T. Brown. 31 Mar 63, 111p. Rept. no. DSR9159 1
Contract AF33 657 8384
Unclassified report

Descriptors: (*Air-breathing engines (Unconventional), Monitors), (*Pneumatic devices, Fluid flow), Jets, Automatic, Gas flow, Gas turbines, Pressure, Control systems, Fluids, Amplifiers.

A study is made of fluid jet devices with no moving mechanical parts, which can serve as rugged sensing and control elements in advanced air-breathing propulsion systems. A basic approach for a quasi-static prediction for the dynamic behavior of controlled jets is presented, and implemented by a digital computer. Experimental results of a basic investigation of the impingement of a turbulent jet onto a flat plate are given for a wide variation of Reynolds numbers, and compared with theory. The static and dynamic interactions of jets with receiver ports are discussed, including theoretical and experimental results. After a discussion of the pressure and temperature environment in which useful engine-control pressure sensors must operate, two particular approaches to the sensor problem are presented. The first is a fluid jet relay to detect large regions of relatively stagnant fluid (rotating stall cells), which can be indicative of an incipient flow instability, and the second is a blade-wake sensor based on fluid diodes coupled to volumes. Theory and experiment to date indicate considerable promise for these devices, although little of the work presented is complete. (Author)

AD-432 399 Div. 27, 12, 10
OTS price $4.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
NOTES ON ENGINEERING ASSISTANCE TO HAWK ROCKET MOTOR PROCUREMENT CONTRACTS,
by Antonio Caldarelli and Richard E. Crater. Feb 64, 43p.
PA TM 1328 Unclassified report

Descriptors: (*Rocket motors (Solid propellants), Procurement), Production, Processing, Corrections, Performance (Engineering), Reliability, Quality control, Maintenance, Packing materials, Acceptability, Monitors, Guided missiles (Surface-to-air), Research program administration.

Picatinny Arsenal was assigned the responsibility for engineering support to HAWK Rocket Motor production contracts. As a result of the XM22E7 HAWK motor failing to pass qualification tests because of liner problems, the Picatinny engineering support role was limited to the status of monitoring the HAWK Rocket Motor production program. Many of the engineering changes proposed by the Rocket Motor contractor should have been implemented during the early motor development phase. It is possible that greater cost savings would have been realized if the motor changes were implemented in the early designs. As MICOM would directly procure HAWK Rocket Motors after the FY62 Buy, the Command planned on using its own engineering facilities to completely support the motor production programs. (Author)

AD-432 418 Div. 27
OTS price $8.60

Stanford U., Calif.
A STRATIFIED CHARGE TWO-STROKE SPARK IGNITION ENGINE (RAM STRATICHARGE, VEE-4, 108.6 CU. IN. DISP.) PERFORMANCE CHARACTERISTICS,
by H. E. Fandrich. Feb 64, 98p. Rept. no. TR S1
Contract Nonr22523, Proj. NR090 342
Unclassified report

Descriptors: (*Internal combustion engines, Fuel injection), Ignition, Hydrocarbons, Fuel consumption, Combustion, Performance (Engineering), Air, Combustion chamber gases, Exhaust gases, Combustion products.

The RAM vee-4, two-stroke stratified charge engine is a spark-ignition, blown, pressure lubricated, port valve engine with a cam actuated auxiliary air inlet poppet valve. It is designed to operate with lean air-fuel ratios, like a compression-ignition engine, but with a low compression ration and spark ignition. No carburetor is employed. Either timed or continuous manifold fuel injection upstream from the auxiliary valve may be used. The tests reported here are for continuous injection. Valve timing had the most pronounced effect on hydrocarbon emissions, followed by auxiliary-air pressure. Spark timing, oil temperature and jacket water temperature also influenced the emissions but to a lesser extent. These adjustments also affected the specific fuel consumption. Generally an adjustment which reduced the air-fuel ratio also reduced the hydrocarbons. The current data suggest that timed fuel injection in place of continuous injection may result in a further significant reduction of hydrocarbons in the exhaust. (Author)

AD-432 593 Div. 27
OTS price $3.60

Pyronetics, Inc., Santa Fe Springs, Calif.
DEVELOPMENT OF LOW PRESSURE LIGHT WEIGHT ROCKET SYSTEM COMPONENTS.
Final rept., 1 July 61-31 Mar 63,
by Hans F. Eckardt. Aug 63, 39p.
Contract AF04 611 7536, Proj. 3058, Task 30513
RTD TDR63 1058 Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Design), Liquid rocket propellants, Propellant control, Fluid flow, Pressure regulators, Cut-off valves, Solenoids, Check valves, Valves, Hydraulic seals, Low pressure research, Propellant tanks, Pressure, Fuel systems, Weight.

New concepts were investigated for integration of components for low pressure liquid propellant rocket engines. Combining the functions of many components in complete subsystems, and use of new design concepts in the subsystems greatly reduced the number of parts required to perform subsystem functions. System integration and simplification ultimately lead to improved reliability and weight reduction. Two integrated subsystems were investigated: a system for propellant tank pressurization, and a system for propellant flow control. The pressurization system included all the functions normally provided by fill and drain valves, solenoid operated shut-off valve, pressure regulator, check-valves and relief valves. The propellant system included all the functions normally provided by fill and drain valves, check valves, shut-off valves, and propellant mixture ratio control device. The pressurization system weighed 0.31 lbs. and utilized the flow force concept in both the regulator and check valves. This concept is based on application of the forces generated on valve elements by the change in momentum of the working fluid. The propellant system weighed 0.43 lbs. and used a mechanical ratio control device for flow ratio control at any flow rate or pressure. (Author)

AD-432 821 Div. 27, 30
OTS price $.50

Research and Technology Div., Air Force Systems Command, Edwards, Calif.
TESTING TECHNIQUES FOR ELECTRIC PROPULSION ENGINES. SUMMARY OF INFORMATION PRESENTED AT THE ASD TESTING TECHNIQUES CONFERENCE IN SEPTEMBER 1962,
by R. R. John, E. Pinsley, Kenneth E. Vickers and Jack W. Geis. Jan 64, 19p.
Proj. 3141
RTD TDR63 4253 Unclassified report

Descriptors: (*Arc-jet engines, Test methods), (*Ion engines, Test methods), Electric propulsion, Thrust, Measurement, Power, Electric currents, Electric potential, Specifications, Test equipment.

Measuring techniques for accurately determining the characteristics of electric propulsion engines are discussed and analyzed. Techniques for both electrothermal and electrostatic engines are considered. Indications are that the thrust of an electrothermal engine may be measured to ±2 percent. With certain flow rates, the mass flow of an electrothermal engine can be measured to about ±2 percent. The primary source of error is the absolute calibration of the flowmeter. Both a d-c voltmeter and an ammeter and a standard crossed-coil wattmeter should be used to measure the input power. However, the input power can be estimated to only ±2 percent. Different measurement techniques are appropriate for the various electrostatic engines. Two techniques for thrust and mass flow measurements have been used with reasonable convenience and accuracy. The total input power to electrostatic engines can be determined by measuring all input voltages and currents. (Author)

AD-433 055 Div. 27, 10, 30
OTS price $2.60

Aerojet-General Corp., Sacramento, Calif.
WEAPON SYSTEM 107A-2 PRODUCT ENGINEERING PROGRAM. COATED METALLIC THRUST CHAMBERS EXPANDABLE NOZZLES COMBUSTION INSTABILITY SCALING CONCEPTS ABLATIVE THRUST CHAMBERS,
Monthly progress rept. 1-29 Feb 64.
15 Mar 64, 30p. Rept. no. 212 SA3 2 2 M7
Contract AF04 694 212
Unclassified report

Descriptors: (*Combustion chambers, Refractory coatings), (*Refractory coatings, Thermal insulation), (*Rocket motors (Liquid propelland), Rocket motor nozzles), Model tests, High-temperature research, Quality control, Nitrogen compounds, Tetroxides, Performan.e (Engineering), Regenerative, Thrust, Stability, Ablation, Film cooling, Design, Wind tunnel models, Hydrazine, Methylitydrazines, Liquid rocket propellants, Production, Processing, Thrust vector control systems, Boundary layer, Movable nozzles.

AD-433 091 Div. 27
OTS price $2.60

Ogden Air Materiel Area, Hill Air Force Base, Utah.
SHELF AND SERVICE LIFE TEST OF ROCKET MOTORS, M16E3 FOR MACE (MGM-13A),
by Alden T. Arbon. Mar 64, 27p.
OOY TR64 877 Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Life expectancy), Captive tests, Visual inspection, Radiography, Low temperature research, High temperature research, Storage, Rocket igniters, Pyrogens, Arming device, Safety, Specifications, Pressure, Time, Performance (Engineering), Interior ballistics, Guided missiles (Surface to surface).

Tests were accomplished to determine the feasibility of extending the combined service and shelf life of the M16E3 Rocket Motor for the MGM-13A Missile System. Inspection, both visual and radiographic, along with static firing was accomplished on five motors, age 60 months. Tests were conducted at -30 F and 160 F. X-ray examination revealed several small propellant defects. These defects did not have an adverse

effect on performance. One motor, was not considered a representative sample of the inventory, leaked at the forward end. No malfunctions occurred in the other motors and ballistic parameters were within specification limits. It is recommended that the combined service and shelf life of the M16E3 Rocket Motor be extended to 6-1/2 years provided continuous vigilance is maintained on the exudate condition. (Author)

AD-433 195 Div. 27, 29, 14
OTS price $1.10

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
PAN 2-17, SPECIFICATION FOR A CLEANING AID IN THE HOT SECTION JET ENGINE CLEANING PROCESS; DEVELOPMENT OF A QUALIFIED PRODUCTS LIST IN ACCORDANCE WITH REQUIREMENTS OF.
23 Mar 64, 1p.
NAEC AML 1911 Unclassified report

Descriptors: (*Jet engines, Cleaning compounds), (*Cleaning compounds, Turbojet engines), Specifications, Standardization, Acceptability, Reliability, Maintenance, Cleaning, Effectiveness, Sodium compounds, Hydroxides.

AD-433 217 Div. 27
OTS price $1.70

Alpha Div., Thiokol Chemical Corp., Huntsville, Ala.
ARMY MATERIALS RESEARCH AGENCY PROGRAM: CASE EVALUATION.
Interim technical rept., 22 June-21 Dec 63.
23 Mar 64, 10p.14 64
Contract DA01 021ORD11919
Unclassified report

Descriptors: (*Rocket cases, Test methods), Steel, Stainless steel, Stretch forming, Cryogenics, Manufacturing methods, Test methods, Hydrostatic pressure, Helixes, Cold working, Drawing (Mechine processing), Nickel alloys.

The objective of this program is to evaluate experimental rocket motor cases produced under the Army Materials Research Agency (AMRA) Program. The evaluation is made through engineering analyses of tests conducted on cases and sample materials. Physical and aging tests and static firings are used to evaluated the techniques and materials of case construction. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-431 206 Div. 28
OTS price $1.25

Behavorial Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
MEASURING AMOUNT OF PRIOR EXPOSURE TO MEANINGFUL WORDS,
by John F. Wing. Oct 63, 53p.
Proj. 7183, Task 718305
AMRL TDR63 94 Unclassified report

Report on Physiological Research on Human Performance.

Descriptors: (*Verbal behavior, Stimulation), Social communication, Performance tests, Measurement, Bibliographies, Analysis, Tables, Frequency.

An important aspect of psychological research on verbal behavior is precise knowledge of the characteristics of the verbal stimuli being used, especially the amount of prior exposure subjects have had to the stimuli. It is impossible to determine directly just how much prior exposure subjects have had to meaningful words such as those used in everyday communications. Therefore, some indirect measure must be employed. This report describes and compares four, possible, indirect measures of prior exposure that experimenters may use: frequency of usage (F); judged familiarity (f); meaningfulness (m); and degree of polarization (D4). Reliability coefficients are given for each measure (when available) as well as the intercorrelations between the four measures. Finally, a comparison is made of the four measures against certain criteria important to research on verbal performance. (Author)

AD-431 257 Div. 28
OTS price $1.10

Ohio State U., Columbus.
CONSISTENCY BETWEEN ATTITUDINAL AFFECT AND SPONTANEOUS COGNITIONS,
by Milton J. Rosenberg and Philip K. Oltman.
1964, 9p. TR1
Contract Nonr495 24
Unclassified report

Formerly with Yale Univ. under Contract Nonr609 27.

Descriptors: (*Attitudes, Social communications), Measurement, Sociometrics, Experimental data.

A new method for eliciting and quantifying the cognitive aspect of social attitudes was described. Data were reported concerning the relationship between an index of attitudinal cognition based upon this procedure and a separate index of attitudinal affect. These data seem relevant to the field of attitude study in two ways: they provide useful additional confirmation of the proposition that the affective and cognitive components of attitudes are typically organized in close consistency with one another; they help validate a new method of attitude measurement that may have wide utility both in experimental studies and in sample surveys of social attitudes. (Author)

AD-431 263 Div. 28
OTS price $1.60

Ohio State U., Columbus.
THE INFLUENCE OF TRANSMISSION AND RECEPTION SETS UPON ACCEPTANCE OF ATTITUDE DISCREPANT INFORMATION,
by Shel Feldman and Milton J. Rosenberg. 1964, 13p., TR2
Contract Nonr495 24
Unclassified report

Formerly with Yale Univ. under Contract Nonr609 24.

Descriptors: (*Attitudes, Education), (*Attitudes, Instrumentation), Data, Errors, Data transmission systems, Sociometrics, Social communication, Analysis.

A favorable attitude toward progressive education was implanted in experimental Ss by means of a role-playing technique. After being set either to transmit their judgments or to receive still further elucidation of the problem later on, Ss were given information discrepant with the implanted attitude. Their acceptance of that information was then measured. A significantly larger proportion of those with the transmission set accepted the discrepant conclusion than did those with the reception set. The reason for this result was traced to difference in the task approaches taken by transmitters and receivers respectively. The expectation that more information was still to be received allowed employment of the defensive strategy of insulating the previously established attitude from the new, discrepant information; the use of this strategy was weakened by the necessity to transmit the information at one's disposal. (Author)

AD-431 284 Div. 28, 6
OTS price $1.60

Pennsylvania U., Philadelphia.
(No title).
Final rept.,
by Eugene Galanter. 1963, 14p.
Contract Nonr55137
Unclassified report

Descriptors: (*Sensory mechanism, Theory), Data, Signals, Detection, Attitudes, Noise, Errors, Reaction (Psychology), Memory, Psychology, Handbooks, Education, Processing.

The objectives of the present research involved the study of the basic psychological phenomena that underlay the processing of sensory information. In order that this report may reveal the coherence of the study of the underlaying problems, we shall divide the report into three major categories and discuss topics under these categories in their historical order. The three categories of discussion are: I. Laboratory Research; II. Field Research; and III. Educational Consequences. (Author)

AD-431 611 Div. 28
OTS price $14.00

Aeronutronic, Newport Beach, Calif.
HUMAN FACTORS ASPECTS OF RELIABILITY.
Final rept., 1 July 62-30 Sep 63,
by Gilbert E. Miller, Richard A. Maxwell, Linda Ferguson and Charles J. Galbo. Jan 64, 205p. Pub. no. U2296
Contract DA36 039sc90877, Proj. 3A95 20 001
Unclassified report

Descriptors: (*Human engineering, Reliability), Weapon systems, Perception, Visual acuity, Stress, Mathematical models, Sampling, Simulation, Performance tests, Digital computers, Computers, Programming (Computers), Punched cards, Input-output devices.

This document presents the final report of the Human Factors Aspects of Reliability program of research. The report contains a review of the literature related to this project, a review of the basic methodology developed for predicting man-machine system reliability, a report of the results of the application of the methodology in Signal Corps R&D programs, and the relationship of the study to present Signal Corps human factors and reliability technical requirements. The procedures for generating task equipment analysis (TEA) data and the means of translating these data to input data for the predictive model are presented. The manner in which the TEA data were converted to input data is presented in the Appendix. Alternative approaches investigated during the course of this study are discussed. The methodological approach and the mathematics utilized in deriving the predictive model and the program for formulation are presented in detail in the report. The manner in which the program output summaries and the detailed program listings of simulation runs can be utilized are also discussed and described. (Author)

AD-431 634 Div. 28
OTS price $.75

Laboratory of Aviation Psychology, Ohio State U. Research Foundation, Columbus.
TERM EXPECTATION AND UNCERTAINTY IN HUMAN DECISION BEHAVIOR,
by Jerry D. Tate and William C. Howell. Nov 63, 18p.
Contract AF33 616 7122, Proj. 7184, Task 718403
AMRL TDR63 118 Unclassified report

Report on Human Performance in Advanced Systems.

Descriptors: (*Behavior, Decision making), (*Decision making, Motivation), Analysis, Effectiveness, Language, Performance tests, Group dynamics.

This study was conducted to investigate the manner and degree to which a decision makers sequence of decisions is influenced by objectives of varying remoteness (term expectation) and by informational uncertainty. The effects of these two variables on sequential decision performance were studied in a 4 x 4 factorial experiment. Term expectation was defined as the number of problems over which the decision maker accumulated his score. Uncertainty was manipulate by controlling the number of events from which the subject was to predict a terminal event. Decisions (predictions) were made either at prescribed uncertainty levels or on a freely chosen basis (depending on the prevailing experimental conditions), and a range of choices varying in degree of risk and payoff was available at each uncertainty level. The same five subjects served in all conditions of the experiment. Choices were evaluated in terms of risk, expected value, and average departure from linear progression to mean winning score (DFL). No significant differences were obtained for term expectation, per se. Maximum expected values were achieved at intermediate levels of uncertainty. (Author)

AD-431 851 Div. 28, 16
OTS price $1.10

Institute for Psychological Research, Tufts U., Medford, Mass.
EFFECTS OF PROLONGED UNUSUAL STIMULUS CONDITIONS ON PERCEPTUAL DISCRIMINATION AND PERCEPTUAL-MOTOR PERFORMANCE.
Final rept.,
by Sanford J. Freedman. 15 Jan 64, 9p.
Grant AF AFOSR53 63
AFOSR 64 0197 Unclassified report

Descriptors: (*Perception, Audiometry), (*Motor reactions, Stimulation), Noise, Motion, Head, Errors, Performance tests, Vision, Hearing, Adaptation (Physiology), Eye, Measurement.

AD-431 853 Div. 28
OTS price $1.60

Cincinnati U., Ohio.
INTERACTION BETWEEN SUBJECT VARIABLES AND CONDITIONS OF LEARNING: A PRELIMINARY STUDY,
by Bernard Bernstein, Alfred B. Kristofferson and John A. Modrick. Oct 63, 12p.
Contracts AF33 616 6835, AF33 616 7674, Proj. 1710, Task 171004
AMRL P61 Unclassified report

Report on Training, Personnel and Psychological Stress Aspects of Bioastronautics.

Descriptors: (*Learning, Performance tests), (*Psychometrics, Learning), (*Verbal behavior, Stimulation), Social communications, Test methods, Group dynamics, Analysis, Training, Personnel, Stress (Psychology), Galvanic skin response, Reasoning, Electrical conductance, Tables, Behavior.

A preliminary investigation was made of the interactions which might exist between certain individual differences and various learning conditions. Each subject learned a list of twenty paired objectives under one of the following modes on the Subject Matter Trainer: (a) the Quiz Mode, in which the subject could elicit the correct response to a given stimulus without first attempting to guess the correct answer; (b) the Modified-Quiz Mode, in which the subject was required to make one guess before being shown the correct response; (c) the Practice Mode, in which the subject was required to continue guessing until he discovered the correct response; and (d) the Single-Try Mode, in which the subject made a single guess on each item and was informed only that this guess was correct or incorrect. Fifteen subjects were assigned to each mode. (Author)

AD-431 894 Div. 28, 12
OTS price $3.60

Dunlap and Associates Inc., Santa Monica, Calif.
PROFICIENCY TESTS FOR MISSILE TECHNICIANS MAINTAINING THE TELEMETRY GROUND STATION EQUIPMENT AN/SKH-1 AND AN/UKR-10,
by Clyde A. Brictson. Feb 64, 31p. Rept. no. ND64 36
Contract Nonr2978 00
Unclassified report

Descriptors: (*Guided missile personnel, Performance tests), Telemeter systems, Ground support equipment, Maintenance personnel, Analysis, Simulation.

The procedures used to develop an advanced telemetry performance test for missile technicians are described. Fleet fault data collection and analysis procedures are discussed in terms of providing a basis for test simulation of representative equipment faults. The test is designed to allow diagnostic appraisal of technician ability to detect chassis malfunctions during preventive maintenance tasks and provides a systematic step-by-step assessment of fault isolation and correction procedures. The test is integrated with a previously developed performance test for administrative compatibility and flexibility. (Author)

AD-431 936 Div. 28
OTS price $2.60

Bucknell U., Lewisburg, Pa.
PERSONALITY CORRELATES OF THE FEAR OF FAILURE VS. NEED ACHIEVEMENT INDIVIDUAL. 2. A CLINICAL PICTURE,
by Richard C. Teevan and W. Ross Hartsough. 1964, 21p. Rept. no. TR6
Contract Nonr359101, Proj. NR171 803
Unclassified report

Descriptors: (*Personality, Fear), (*Fear, Achievement tests), (*Attitudes, Fear), Behavior, Measurement, Theory, Tables, Group dynamics.

The purpose of this paper is to predict to various clinical measures of mode and degree of adjustment from the HP and n. Achievement systems, and to study further sex-differences within and between these systems. The four scales against which prediction will be made are the Minnesota Multiphasic personality inventory, the Allport & Allport A-S Reaction Study, the James-Phares Scale, and Siegel's Manifest Hostility Scale. (Author)

AD-431 937 Div. 28
OTS price $1.60

Bucknell U., Lewisburg, Pa.
THE RELATIONSHIP BETWEEN INCENTIVE AND EXPECTATIONS OF SUCCESS,
by Harvey Burdick and Nancy Stoddard. 1964, 18p. Rept. no. TR7
Contract Nonr359101, Proj. NR171 803
Unclassified report

In cooperation with Oakland Univ. Calif.

Descriptors: (*Motivation, Job analysis), (*Job analysis, Motivation), Errors, tTables.

AD-431 938 Div. 28
OTS price $3.60

Bucknell U., Lewisburg, Pa.
PERSONALITY CORRELATES OF FEAR OF FAILURE VS. NEED ACHIEVEMENT INDIVIDUAL. 1. VALUES SCALES,
by Richard C. Teevan and W. Ross Hartsough. 1964, 30p. TR5
Contract Nonr359101, Proj. NR171 803
Unclassified report

Descriptors: (*Psychology, Test methods), Fear, Achievement tests, Attitudes, Sex, Motivation.

Twenty-two males and thirty females, students in an introductory psychology class, were administered the TAT - Fantasy slides from the Hostile Press (HP) system (Birney et al., 1961, 1962), the Allport-Vernon-Lindzey, S<TUDY OF Values (1960) and the Levinson-Sanford et al. F-Scale (in Adorno, 1950) to test hypothesized values differences between the fear of failure (FF) individual as defined by the HP system, and the need for achievement (n. Ach.) individual as defined by McClelland et al. (1953). Sex interactions were also studied. Forteen of sixteen directional predictions were bourne out for the FF male predicting to these values scales. Results pointed to the similarity of attitudinal patterns between FF males and n. Ach. females. The implications of the findings were discussed and further research proposed. (Author)

AD-431 945 Div. 28
OTS price $8.10

Dunlap and Associates Inc., Santa Monica, Calif.
PROFICIENCY TEST FOR MISSILE TECHNICIANS MAINTAINING THE AN/SKQ-1 TELEMETERING GROUND STATION EQUIPMENT. VOLUME III. TECHNICAL REPORT,
by R. E. Blanchard and R. E. Shoemaker. Feb 64, 86p. Rept. no. ND64 37
Contract Nonr297800
Unclassified report

Descriptors: (*Guided missile personnel, Achievement tests), (*Achievement tests, Naval personnel), (*Naval personnel, Job analysis), (*Ground support equipment, Naval personnel), Telemeter systems, Test construction (Psychology), Sampling, Performance tests.

A proficiency test was constructed to evaluated performance of Naval technicians maintaining the AN/SKQ-1 telemetering ground station equipment. The test is to be used for evaluating the preparedness of Navy school graduates for fulfilling the requirements of their fleet jobs and to provide diagnostic feedback to curriculum evaluation appraisal efforts. Job task data were collected from several fleet sources and from Navy school and were analyzed to identify task requirements imposed on the fleet technician. A sampling plan was developed based on a mission contribution criterion. Tasks were then ordered on a continuum of contribution to mission success and activity statements were developed to provide a means for investigating task interrelations and for use in determining sampling effectiveness. Several sampling guides related to mission contribution, scope of task, skill level required and use of test support equipment were developed to facilitate the mechanics of the sampling process. Sampling effectiveness was treated as a function of the degree of representation and the amount of redundancy incurred to achieve hat level. An index of representation and an index of uniqueness were defined to provide a quantitative means for describing the effectiveness of a given sampling configuration. A third index was employed to determine overall sampling effectiveness for the task sample according to sampling plan criteria and for the total job. (Author)

AD-432 028 Div. 28
OTS price $3.00

Dunlap and Associates, Inc., Stamford, Conn.
HUMAN FACTORS TECHNOLOGY IN THE DESIGN OF SIMULATORS FOR OPERATOR TRAINING,
by Alfred F. Smode, Alin Gruber and Jerome H. Ely. 18 Dec 63, 196p.
Contract N61339 1103
NTDC 103 1 Unclassified report

Descriptors: (*Human engineering, Training devices), (*Flight simulators, Design), (*Training, Operators (Personnel)), (*Training devices, Weapon systems), Simulation, Performance tests, Measurement, Job analysis, Standards, Specifications, Tests, Effectiveness, Learning, Tables, Test methods, Vision, Perception, Environmental tests, Display systems, Behavior, Computers.

This report presents an organized body of information useful for dealing with those human factors problems frequently encountered in the development of the Weapons System Trainer. Emphasis is given throughout to the general problems involved in developing the complete training system rather than to the analysis of details specific to given training systems. It summarizes basic human factors information which

influences the design and construction of training devices. Successive chapters of the report are devoted to determining training needs, developing the environment for learning, understanding simulation requirements for training, developing a measurement capability, and discussing the human engineering problems in trainer design. As it provides a considerable background of human factors information pertinent to the synthetic ground environment, this report will be of interest to individuals directly concerned with Weapons System Training programs, preparing trainer specifications, developing training standards, and testing and evaluating simulation equipment. (Author)

AD-432 029 Div. 28, 26, 23
OTS price $1.60

Stanford U., Calif.
PERCEPTION OF LEADERSHIP IN SMALL GROUPS,
by Thomas W. Harrell and Hans E. Lee. Jan 64, 18p. Technical rept. no. 5
Contract Nonr225 62
Unclassified report

Report on A Study of Some Criteria of Management Success.

Descriptors: (*Management engineering, Leadership), (*Leadership, Management engineering), Perception, Effectiveness, Mathematical predictions, Psychometrics, Tables, Education, Group dynamics.

This study represents an attempt to develop valid and predictable criteria of success based on the study of data from the participants in the three classes of the Executive Development Program at the Graduate School of Business, Stanford University. It records an effort to develop success criteria to be used in connection with a large scale study to predict management potential of candidates for the Master of Business Administration (MBA) which is being conducted. Thus, if suitable criteria of success could be found in a group of men who might all be considered successful, but in varying degress, these criteria might be used in the follow-up studies to differentiate the highly successful from the not so successful MBA's after they have graduated from the business school. Using these successful MBA's and EDP's (executives who have participated in the Executive Development Program) as criterion groups, the final goal is to predict before the MBA applicants enter the business school which of the applicants have greater potential for becoming successful general managers on the basis of the SMPTB. Another purpose for studying criteria of management success is to examine the relationship between managerial success in the business world and leadership in small group discussions. It is hypothesized that success depends, in part, on leadership qualities. (Author)

AD-432 078 Div. 28
OTS price $1.60

Educational Testing Service, Princeton, N. J.
RISK TAKING AND ACADEMIC SUCCESS AND THEIR RELATION TO AN OBJECTIVE MEASURE OF ACHIEVEMENT MOTIVATION,
by Albert E. Myers. Jan 64, 16p. Rept. no. RB64 2
Contract Nonr295900
Unclassified report

Descriptors: (*Achievement tests, Motivation), (*Motivation, Achievement tests), Measurement, Psychology.

Two studies using an objective test of Achievement Motivation with high school Ss indicated that the test was able to reproduce the results typically found with projective measures. One was a correlational study dealing with problems of academic achievement while the other was a laboratory study that focused on competitive risk taking. These data seemed to support the proposition that objective tests of achievement motivation may be possible. (Author)

AD-432 087 Div. 28
OTS price $1.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
INDIVIDUAL DIFFERENCES IN TRANSCRIBING VOICE RADIO MESSAGES EMBEDDED IN ATMOSPHERIC NOISE,
by A. E. Castelnovo, J. G. Tiedemann and D. M. Skordahl. Oct 63, 18p.
Proj. 2J024701A713
APRO TR N137 Unclassified report

Descriptors: (*Personnel management, Radio communication), (*Radio communication systems, Operators (Personnel)), (*Human engineering, Voice communication systems), Intelligibility, Job analysis, Monitors, Noise, Atmosphere, Performance tests, Army.

The Monitor Performance Task has as an ongoing objective the accomplishment of research to meet a requirement of the U. S. Army Security Agency for improvement of work methods in several critical human factors areas in the Army's monitor system. The present publication reports on one segment of this research effort which deals with voice radio messages embedded in atmospheric noise. The study was conducted to explore the question of whether individuals show consistent differences in accuracy of transcription and whether any such differences are predictable by conventional measures. Voice-radio transcriber performance under low, medium, and high levels of atmospheric noise is analyzed. Prediction of performance by Army Classification Battery tests and effect of introduction of errors into transcript are examined. Pronounced individual differences in transcription were found, but differences were stable over time and across a broad range of noise intensity. Findings suggest the practicality of the use of a job sample performance measure and standardized sets of noise-masked messages as an approach to the selection problem. (Author)

AD-432 088 Div. 28
OTS price $3.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
PERFORMANCE OF SINGLE VS MULTIPLE VOICE RADIO TRANSCRIBERS WORKING UNDER THREE SPEECH TO NOISE RATIOS,
by A. E. Castelnovo, J. G. Tiedemann and D. A. Dobbins. Sep 63, 33p.
APRO TRN135 Unclassified report

Descriptors: (*Human engineering, Voice communication systems), (*Operators (Personnel), Performance tests), (*Speech, Noise (Radio)), Monitors, Army, Test methods, Noise, Errors.

Effort to improve work methods employed in the Army's monitor systems is critical to the assessment of human performance within the system and to the determination of system reliability. The present study reports on one segment of the research effort--improvement of work methods employed in producing a transcript. Three work methods, differing in the number of transcribers contributing to the final product, were compared with respect to accuracy and completeness of the

resulting transcription. These methods (involving one, two or three transcribers) were tested under three levels of noise which yielded high, medium, and low intelligibility under standard conditions. Data obtained were interpreted by analysis of variance technique. A small but consistent difference in favor of multiple transcriber work methods was found to exist. Differences were statistically significant only at the medium noise level. A secondary finding of potential value was that repeated exposures to a message resulted in some increase in accuracy at low and medium noise levels; repeated exposures at the high noise level were conductive to error. (Author)

AD-432 089 Div. 28
OTS price $2.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
PSYCHOPHYSICAL ASPECTS OF IMAGE QUALITY -- EXPLORATORY STUDY,
by Robert Sadacca and Alfred I. Schwartz.
Sep 63, 22p.
Proj. 2J024701A713
APRO TR N136 Unclassified report

Descriptors: (*Decision making, Performance tests), (*Photographic images, Decision making), Reliability, Images, Acuity, Visual acuity, Military personnel, Military requirements.

The Image Interpretation Task, USAPRO, is responsive to a continuing ACSI requirement for development of techniques to improve utilization and performance of image interpreters. The present study initiates research into the physical qualities of imagery in terms of their potential for intelligence extraction. Sets of photos differing in scale, sharpness, and contrast were ranked by interpreters in terms of ''usefulness for intelligence information extraction''. Relationships of physical variables and interpreter rankings to information output were examined; dimensionality of image quality judgments was further explored through application of multidimensional scaling techniques. Two dimensions--scale and sharpness--were clearly identifiable in judgments of photo quality; two other factors associated with contrast and photo content were also indicated. Findings point to a promising utility of judgment in assessing image quality and to improved intelligence output by interpreters through use of image quality scales. (Author)

AD-432 090 Div. 28, 23
OTS price $2.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
STATUS REPORT ON RESEARCH FOR THE U.S. MILITARY ACADEMY (CADET LEADERS TASK),
by Helen R. Haggerty. Oct 63, 27p.
Proj. 2J024701A722
APRO TRR1133 Unclassified report

Descriptors: (*Military personnel, Measurement), (*Leadership, Job analysis), Training, Selection, Classification, Achievement tests, Analysis, Psychology.

In the continuation of psychological research for the United States Military Academy, initiated during WW II, effort has been largely concerned with improving selection procedures and with evaluating achievement in various aspects of the primary officer training programs. The present report deals with research undertaken in a series of projects covering the period 1 January 1957 through 31 December 1962. The two major problems with which the current research has been concerned are prediction of success of WP graduates in officer assignments of various types and at various levels, and identification of those applicants who show leadership potential and who also are motivated to complete USMA training and subsequent Regular Army officer careers. A number of instruments were developed and administered with the objective of supplementing current selection measures to provide more adequate assessment of motivation and leadership potential. Earlier findings were reinforced in that the Aptitude for the Service Rating (ASR) continues to maintain its predictive superiority over other WP measures with reference to later performance on both field grade and company grade officers. Continuing validity studies and extended follow-up research hold promise for provision of guidance to the USMA in evaluating training given to cadets. (Author)

AD-432 091 Div. 28
OTS price $1.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
PAST EXPERIENCE, SELF EVALUATION, AND PRESENT ADJUSTMENT,
by E. K. Eric Gunderson and Laverne C. Johnson.
Dec 63, 12p.
NMNRU 63 21; NAVMED MR005 12 2004
Unclassified report

Descriptors: (*Adjustment (Psychology), Personality), (*Personality, Adjustment (Psychology)), (*Attitudes, Naval personnel), Psychometrics, Population, Measurement, Psychiatry, Classification, Behavior, Tables, Intelligence tests, Emotions, Social communication.

Self evaluation measures in a population of young, healthy Navy men correlated significantly with a composite of biographical information reflecting family instability and conflict, inconsistent or extreme disciplinary practices by parents, and persistent difficulties in school adjustment. Factor analysis of the self evaluation inventory yielded eight factors which provided a more meaningful differentiation of attitudes toward self than the global measures of body-cathexis and self-cathexis used previously. The self evaluation measures correlated in the expected direction with attitude measures of interpersonal maturity and delinquency proneness, positive self-regard being positively related to the Maturity Scale and negatively correlated with the Delinquency Scale. With the exception of one factor-derived scale, Work Attitude, the self evaluation measures did not correlate significantly with any of four military adjustment criteria. It was inferred that the relationships of these self evaluation measures to adjustment probably are of low order in a normal population or are not simple linear ones. (Author)

AD-432 152 Div. 28, 15, 30
OTS price $1.10

California U., Los Angeles.
CONVERGENCE PROPERTIES OF A LEARNING ALGORITHM,
by Leo Breiman and Zivia S. Wurtele. Jan 64, 8p.
Rept. no. WP47
Task 047 041
Unclassified report

Descriptors: (*Learning, Mathematical models), Sampling (Mathematics), Pattern recognition, Communication theory, Statistical analysis, Algebras, Artificial intelligence.

In the learning process described by the algorithm, observations are made on individuals one at a time and the current estimate of the required partitioning may be adjusted after each observation, on the basis of knowledge of the category to which the individual observed belongs. At any given time, the current estimate of the partitioning is all that is held in memory; past history is lost except insofar as it has been incorporated into the present estimate. The learning process of perceptrons, as well as that of other artificial intelligence, is of this general form. It is assumed that each individual is a member of one and only one of two categories. The results obtained are applicable to the more general case, however, for they may be applied to appropriate partitions of a set of three or more categories into two subsets. Each individual in the population is characterized by an attribute vector X in m-dimensional Euclidean space; S1, S2 are the sets of vectors attributed to members of the first and second categories, respectively. (Author)

AD-432 284 Div. 28
OTS price $2.60

Educational Testing Service, Princeton, N. J.
RIGOROUSLY AND NONRIGOROUSLY PARALLEL TEST FORMS, by Frederic M. Lord. Feb 64, 21p. Rept. no. RB64 14
Contract Nonr275200, Proj. NR151 201
Unclassified report

Descriptors: (*Test construction, Design), Theory, Errors, Standards, Measurement, Models (Simulations), Mathematical analysis.

When several test forms are used interchangeably, they will not in practice, despite all efforts, be rigorously parallel. A definition of the standard error of measurement appropriate for this type of situation can be provided; however, it must be different from the definition in classical test theory. Appropriate formulas for the standard error of measurement and for other related quantities under both definitions are derived and compared; also sample statistics for estimating these quantities. (Author)

AD-432 334 Div. 28, 30
OTS price $3.50

RAND Corp., Santa Monica, Calif.
THE SIMULATION OF VERBAL LEARNING BEHAVIOR, by E. A. Feigenbaum. 1 Mar 61, 32p. Rept. no. P2235
Unclassified report

Descriptors: (*Verbal behavior, Learning), (*Learning, Simulation), (*Data processing systems, Models (Simulations)), Computers, Behavior.

An information processing model of elementary human symbolic learning is given a precise statement as a computer program, called Elementary Perceiver and Memorizer (EPAM). The program simulates the behavior of subjects in experiments involving the rote learning of nonsense syllables. A discrimination net which grows is the basis of EPAM's associative memory. Fundamental information processes include processes for discrimination, discrimination learning, memorization, association using cues, and response retrieval with cues. Many well-known phenomena of rote learning are to be found in EPAM's experimental behavior, including some rather complex forgetting phenomena. EPAM is programmed in Information Processing Language V. (Author)

AD-432 357 Div. 28
OTS price $5.60

Rutgers U., New Brunswick, N. J.
VALUES OF JAPANESE AND AMERICAN STUDENTS, by F. K. Berrien. Jan 64, 54p. Rept. no. TR14
Contract Nonr40410
Unclassified report

Descriptors: (*Students, Behavior), Sociology, Psychology, Culture, Urban areas, Rural areas, Personality, Population.

Approximately 1800 high school and college students in Japan completed a version of the Edwards Personal Preference Schedule and were compared with the norms obtained from American college students. It was hypothesized that the Japanese college sample would differ from the American norms in those values which characterized the stereotype of traditional Japanese and which appear to underlie the past political behavior of the Japanese. However, it was further hypothesized that the rural high school sample would show even greater differences in these same respects with the American norms. The findings reveal that the Japanese college men were less dominant and more self-abasing than Americans but were less deferent. Progressions toward American norms were evident only in achievement, dominance and abasement among the men, but among the Japanese women successive samples of students in rural, urban and college populations showed trends away from American norms for achievement and nurturance. Although the data are equivocal, on balance, they suggest that the Japanese are not adopting those psychological values that characterize the American college population, in spite of outward appearances to the contrary. This report draws some inferences and implications from these data concerning the political behavior of the Japanese and the extent to which the existing value pattern supports the democratic political structure set up by the Occupation Forces. (Author)

AD-432 483 Div. 28, 18
OTS price $1.00

6570th Aerospace Medical Research Labs., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
ESTIMATING MANNING REQUIREMENTS FOR ADVANCED SYSTEMS: A SURVEY OF THE DEFENSE INDUSTRY, by Donald B. Haines and Sidney Gael. Nov 63, 29p.
Proj. 1710, Task 171006
AMRL TDR63 110 Unclassified report

Report on training personnel and psychological stress aspects of bioastronautics.

Descriptors: (*Human engineering, Defense systems), (*Personnel management, Weapon systems), (*Defense systems, Personnel management), Military requirements, Industries, Mathematical models, Mathematical predictions, Test methods, Job analysis, Control, Training, Stress (Psychology).

The findings of special survey of the manning estimation techniques used by the defense industry are summarized. The defense industry was asked for their methods and problems of estimating manning requirements of advanced weapon systems. The survey was part of a long range program of research aimed at the identification and quantification of manning requirements for advanced weapon systems. A five item, oper-ended questionnaire was sent to human-factors specialists in key defense industries. Respondents were asked to list their experience in predicting manning requirements for systems, to cite the

guides and publications most useful in making these predictions, and to describe the method used in arriving at manning estimates. Five different approaches to estimating manning were reported; the most popular being the use of task analysis or some combination of task analysis with variations of the other approaches. Other methods were: expert estimation, historical comparison, sovereign factors and mathematical models. (Author)

AD-432 498 Div. 28
OTS price $1.00

Ohio State U., Columbus.
AN INVESTIGATION OF CONDITIONS INFLUENCING THE DEVELOPMENT OF PERCEPTUAL SETS,
by Delos D. Wickens and Armand N. Chambers.
Oct 63, 26p.
Contract AF33 616 7778, Proj. 1710, Task 171003
AMRL TDR63 98 Unclassified report

Report on Collection and Analysis of Research Data on Human Factors in the Design of Operator Training Equipment.

Descriptors: (*Training devices, Design), (*Operators (Personnel), Training), (*Performance tests, Motor reactions), (*Motor reactions, Performance tests), Perception, Color vision, Stimulation, Tables, Measurement, Analysis of variance, Learning, Theory, Analysis, Operation, Probability.

The experiment was designed to measure transfer effects in a perceptual-motor task when (a) the critical stimulus dimension which was irrelevant in the first task became relevant for performance on the second task and (b) where the same stimulus dimension was relevant for both tasks but responses were interchanged. The experiment was conducted in two sessions separated by 24 hours. On Day 1 subjects learned to make the appropriate one of four responses to each of a series of 16 stimuli in terms of four stimulus cues based on either the form or color properties of the stimuli. On Day 2 subjects of different groups learned critical variants of the original task. The data suggest that (a) negative transfer is greater when shifting from one dimension of relevance to another than when changing the responses required within the same stimulus dimensions and (b) only weak evidence that partial reinforcement is responsible for the difficulty in shifting to learning in the new dimensions. These results imply that, in designing a trainer, it would be highly inadvisable to include a stimulus dimension which would be relevant in the operational situation and not have it relevant for performance on the trainer. (Author)

AD-432 560 Div. 28
OTS price $1.60

Gustavus Adolphus Coll., St. Peter, Minn.
COGNITIVE DISSONANCE AND THE EFFECTIVENESS OF PERSUASIVE COMMUNICATIONS.
Final rept., 1 Jul 62-31 Jul 63,
by James O. Whittaker. 31 Jul 63, 15p.
Grant AF AFOSR 62 188
AFOSR 64 0198 Unclassified report

Descriptors: (*Attitudes, Social communication), (*Social communication, Attitudes), (*Reasoning, Stimulation), Recording systems, Attitude indicators, Measurement, Sociometrics.

AD-432 563 Div. 28, 16
OTS price $3.60

Duke U. School of Medicine, Durham, N. C.
BODY AND FIELD PERCEPTUAL DIMENSION AND ALTERED SENSORY ENVIRONMENTS.
Annual rept. Oct 62-Oct 63,
by Sanford I. Cohen and Albert J. Silverman.
Oct 63, 37p.
Grant AF AFOSR57 63
AFOSR 64 0201 Unclassified report

Descriptors: (*Perception, Psychology), (*Sensory mechanisms, Perception), Drugs, Reaction (Psychology), Stress (Psychology), Proprioception, Physiology, Heart, Hypoglycemia, Insulin, Behavior, Learning, Nervous system.

AD-432 564 Div. 28, 32
OTS price $1.60

Delaware U., Newark.
THE EFFECTS OF CHANGES IN GROUP COMPOSITION ON GROUP PERFORMANCE.
Final rept.,
by R. C. Ziller. 1964, 11p.
Grant AF AFOSR116 63
AFOSR 64 0202 Unclassified report

Descriptors: (*Group dynamics, Psychology), Behavior, Attitudes, Leadership, Social communication, Adjustment (Psychology).

AD-432 565 Div. 28
OTS price $1.10

Bucknell U., Lewisburg, Pa.
COMPARATIVE STUDY OF REINFORCEMENT IN A VERBAL LEARNING TASK.
Final rept.
1962, 4p.
Grant AFOSR62 323
AFOSR 64 0203 Unclassified report

Descriptors: (*Performance tests, Psychology), Achievement tests, Analysis, Reaction (Psychology), Errors, Teachine machines.

AD-432 587 Div. 28
OTS price $1.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
THE VISUAL PERCEPTION OF SPATIAL EXTENT,
by Walter C. Gogel. Sep 63, 13p.
CARI 63 20 Unclassified report

Descriptors: (*Vision, Space perception), (*Space perception, Psychology), Mathematical analysis, Measurement.

This study was concerned with the manner in which perceived depth and perceived frontoparallel size varied with physical distance and hence with each other. An equation expressing the relation between perceived frontoparallel size and physical depth was developed and applied to frontoparallel size judgments determined with four observers under two viewing conditions. Using the same equation and an expression of the size-distance invariance hypothesis, an additional equation was developed which related perceived and physical depth. The additional equation, when applied to judgments of perceived depth from the same observers under the same viewing conditions, produced results not in agreement with those expected from the size-distance invariance hypothesis. This is interpreted as evidence against the validity of the size-distance invariance hypothesis in its usual form. The results from the apparent depth judgments also were applied to the problem of the nonveridicality of the perceptual bisection of depth intervals. (Author)

AD-432 707 Div. 28
OTS price $.50

Dayton U., Ohio.
THE EFFECTS OF CURVILINEAR AND DISCRETE TRANSFORMATIONS OF ERROR INFORMATION ON HUMAN TRACKING PERFORMANCE,
by Darwin P. Hunt. Dec 63, 13p.
Contract AF33 616 7863, Proj. 7183, Task 718303
AMRL TDR63 137 Unclassified report

Incooperation with Antioch Coll., Yellow Springs, Ohio, AF33 657 7362. Report on Psychological Research on Human Performance.

Descriptors: (*Human engineering, Tracking), (*Tracking, Performance tests), (*Transformations, Errors), (*Linear systems, Transformations), Display systems, Control sticks, Coding, Control, Analysis of variance, Job analysis, Effectiveness, Nonlinear systems.

The effects of discrete nonlinear transformations of tracking error information on the accuracy and efficiency with which the human operator can perform a compensatory tracking task were studied. Nine groups of seven subjects each were given forty 1-min. trials under nine different informational display conditions. The nine informational conditions were obtained by combining three levels of information quantization (3, 7, or 11 categories of information) with three types of overall relationships between the displayed error and the actual error (linear, nonlinear magnification, or nonlinear minification). Indices of tracking accuracy and tracking efficiency were obtained by integrating absolute values of the voltage analogs of the actual tracking error and of the control stick deflections, respectively. Greater tracking accuracy was associated with (1) a linear relationship between displayed error and actual error, (2) a larger number of informational categories and (3) practice. Generally, tracking accuracy improved in a negatively accelerated fashion as the number of informational display categories increased. Tracking efficiency generally increased with practice. Also, practice exhibited a differential influence on tracking efficiency depending upon the number of informational display categories. (Author)

AD-432 753 Div. 28
OTS price $4.60

Purdue U., Lafayette, Ind.
THE EFFECT OF FORCED COMPLIANCE OF RECOGNITION.
by Phillip Ronald Ferdinand. Jan 64, 42p.
Unclassified report

Master's thesis.

Descriptors: (*Reasoning, Analysis), (*Attitudes, Reasoning), Learning, Performance tests, Analysis of variance, Group dynamics, Test methods.

The prupose of this thesis is to present a study of the effects of cognitive dissonance upon the processes of learning and the changing of attitudes toward test preferences. Dissonance was induced by changing only three words in the instructions given to all subjects. All subjects in the control group were told they would receive credit and be allowed to take the type of tests they preferred. In addition, they were told that the results of their efforts would be used in the study. Analysis of the data revealed that no cretid (dissonance) subjects attained a significantly higher mean recall score than credit subjects. Those subjects (both credit and no credit) who were allowed to take the tests they least preferred had a net attitude change toward the tests taken which was considerably higher than those subjects who were allowed to take the tests they most preferred. Analysis of a post-experimental survey revealed that dissonant subjects did not feel any obligation to the experimenter nor did they feel forced to participate in the experiment. Each indicated that they felt free to leave the experiment until such time as they actually committed themselves to participate. (Author)

AD-432 823 Div. 28, 23, 32
OTS price $5.60

Serendirity Associates, Sherman Oaks, Calif.
RESEARCH ON MECHANISMS FOR THE CONTROL OF STRESS.
Final rept.,
by Ewart E. Smith. 31 Jan 64, 60p.
Contract AF49 638 1216
AFOSR 64 0190 Unclassified report

Descriptors: (*Stress (Psychology), Theory), (*Labor, Stress (Psychology)), Group dynamics, Air Defense Command, Leadership, Attitudes, Emotions, Personality, Behavior, Social communication, Social science.

AD-432 826 Div. 28, 15
OTS price $.50

6570th Aerospace Medical Research Labs., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
CONTROL OF A DISCRETE STOCHASTIC PROCESS AS A FUNCTION OF THE COSTS FOR MAKING CORRECTIVE ACTIONS.
Rept. for Dec 61-Feb 62,
by John P. Hornseth, Walter J. Huebner and William H. Pearson. Dec 63, 17p.
Proj. 7184, Task 718403
AMRL TDR63 111 Unclassified report

Report on Human Performance in Advanced Systems.

Descriptors: (*Stochastic process, Human engineering), Performance tests, Costs, Control, Design, Tolerances (Physiology), Errors, Automation, Models (Simulations), Probability, Analysis of variance.

This research examines man's ability to control a discrete stochastic process. The cost (C1) for correcting the process before it exceeded an arbitrary tolerance limit served as the experimental variable. The cost (C2) for correcting this process after it exceeded the tolerance limit was fixed. For low C1 costs the human controller achieved optimum control (i.e., minimized control cost) within four 100-cycle trials. For high C1 costs the human controller achieved a level of control equivalent to that of the optimum controller on the first 100-cycle trial. An additional requirement to serve as a statistical sensor was imposed in controlling the process under low C1 cost conditions. The human controller's response to this requirement was appropriate. The implications of these results to the design of discrete stochastic process controllers is discussed. (Author)

AD-432 877 Div. 28
OTS price $4.60

Illinois U., Urbana.
THE INFLUENCE OF LEADER AND MEMBER BEHAVIOR ON THE ADJUSTMENT AND TASK EFFECTIVENESS OF NEGOTIATION GROUPS,
by James W. Julian and Joseph E. McGrath.
Oct 63, 44p. Technical rept. no. 17
Contract DA49 193md2060
Unclassified report

Descriptors: (*Group dynamics, Effectiveness) (*Behavior, Leadership), (*Social communication, Personality), Adjustment (Psychology), Job analysis, Stimulation.

This study investigated group interactions which mediate the observed relationships between experimental input conditions and group output. The study examined three major sets of relationships: (1) the different patterns of chairman behavior which are associated with differences in the chairman's perception of co-workers; (2) the patterns of chairman interaction which lead to more successful negotiation; and (3) the characteristics of the group interaction that increase the satisfaction and performance of the group members. The major conclusions of the study were: (1) The more psychologically distant (low LPC) chairmen were more active, dominant, and emotionally negative in their interpersonal behavior, and the psychologically closer (high LPC) chairmen were more passive, accepting and positive in their behavior. (2) Chairmen who were more active, dominant, but positive led more successful negotiation groups. (3) The communication of more positive, and less negative, feeling by group members was associated with higher group member satisfaction, interpersonal esteem, and negotiation success. (Author)

AD-432 968 Div. 28, 16
OTS price $3.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
PSYCHOLOGICAL PROBLEMS IN DISORIENTATION,
by Randall M. Chambers. 31 Dec 63, 28p.
NADC MA 6321; NAVMED MR005 13 0005 7 8
Unclassified report

Descriptors: (*Perception, Space flight), (*Space medicine, Perception), Visual acuity, Positioning reactions, Time, Reaction (Psychology), Behavior, Ear, Semicircular canals, Posture, Proprioception, Sensory Mechanisms, Illusions, Motion sickness, Human engineering, Training, Selection.

This report reviews and summarizes research on the varied aspects of disorientation relating to problems encountered by man during space travel. The term disorientation refers to false sensations, incorrectly sensed cues, misperception, and inappropriate responses to stimuli which result in perceptual frames of reference at variance with reality. Special problem areas, such as time disorientation and visual disorientation, are evaluated in terms of astronaut performance requirements during prolonged space flight. In considering the problems of disorientation in position and motion, the role of the visual system, the labyrinthine system (vestibular apparatus of the inner ear), and the extralabyrinthine system (peripheral pressure, muscle, and posture senses) are summarized. Illusions of position and motion are described and their involvement in space flight operations are discussed. It is emphasized that once the stimuli, responses, and basic physiological and psychological mechanisms are understood for specific space flight missions, techniques of selection, adaptation, training, and human engineering may be used to increase man's ability to tolerate the stressful conditions and to perform as a reliable unit within any spacecraft system. (Author)

AD-432 982 Div. 28
OTS price $1.60

Bucknell U., Lewisburg, Pa.
DIMENSIONS OF THE ''CONFIRMING INTERVAL'' AS A MEASURE OF LEVEL OF ASPIRATION,
by Richard C. Teevan, Barry D. Smith and David J. Loomis. 1964, 18p. Technical rept. no. 8
Contract Nonr3591 01, Proj. NR171 803
Unclassified report

Descriptors: (*Rifling, Performance tests), (*Performance test, Analysis), (*Behavior, Measurement), Achievement tests, Theory, Tables, Test methods, Behavior, Electronic equipment, Analysis of variance, Group dynamics.

AD-433 056 Div. 28
OTS price $1.10

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
EFFECT OF SORTING PROCEDURE ON ACCURACY OF ORDINAL RANKING,
by Joseph M. Madden, Joe T. Hazel and Roger D. Bourdon. Jan 64, 8p.
Proj. 7734, Task 773402
PRL TDR64 1 Unclassified report

Descriptors: (*Intelligence tests, Military personnel), (*Classification, Selection), Air Force, Psychometrics, Analysis of variance, Errors, Satistical data, Aptitude tests.

Although ranking is often used by research personnel and by others working in supervisory and management situations, there has been practically no development work done on the method itself. Many techniques for accomplishing rank-ordering are devised, but their efficacy is rarely tested. In an attempt to determine the most effective sorting procedure to arrive at accurate rankings, a task was selected that permitted an objective measure of error. 54 cards were prepared that showed pairs of circles differing in area by graduated amounts. The task was to order the cards by size of difference in circle area. 5 samples of 52 airmen were each directed to sort the cards by one of 5 methods. 4 methods were structured in varying degrees; in the fifth, subjects were free to sort as they pleased. Analysis of variance demonstrated significant differences between methods. The free-sort method yielded the least average error, suggesting that for judgments of the type used in this study, there is no gain in accuracy of ranking from specifying the method of sorting. (Author)

AD-433 109 Div. 28, 16
OTS price $7.60

Princeton U., N. J.
ON THE VISUAL DETECTION OF ACCELERATED MOTION,
by Ross D. L. Filion. Sep 63, 79p.
Contract AF49 638 381
AFOSR 64 0189 Unclassified report

Doctoral thesis.

Descriptors: (*Acceleration, Detection), (*Perception, Motion), Visual acuity, Psychometrics, Analysis of variance, Behavior, Reaction (Psychology), Psychology, Physiology.

AD-433 199 Div. 28
OTS price $3.50

Illinois U., Urbana.
A TAXONOMY OF LEARNING TASK CHARACTERISTICS,
by Lawrence M. Stolurow. Jan 64, 203p.
Contract AF33 616 5965, Proj. 1710, Task 171003
AMRL TDR64 2 Unclassified report

Descriptors: (*Learning, Training devices), (*Job analysis, Learning), Classification, Training, Attention, Measurement, Psychology, Linear systems.

The design of efficient training environments requires the selective uses of research findings from basic studies of learning. Decisions about the use of particular principles of learning are constantly required in the development of new training materials, systems, devices, and aids. Consequently, there is a critical need for a system of classifying learning tasks which will permit training specialists to make efficient use of principles of learning. This report is designed to assist a training specialist in the design and development of effective training programs in support of Air Force positions. It presents a system for classifying learning tasks which was developed under this contract for the purpose indicated. The research and analytical procedures are summarized along with the findings produced by a tryout of the system with a group of training specialists. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-431 540 Div. 29, 10
OTS price $1.60

Martin Marietta Corp., Denver, Colo.
TOXICANT ENTRAINMENT TEST-CLOTHING OUTFIT, ROCKET FUEL HANDLERS A/P 22P-1,
by R. G. Hanson. Jan 64, 10p.
Contract AF04 647 576
Unclassified report

Descriptors: (*Protective clothing, Gaslous rocket propellants). (*Test methods, Protective clothing), Nitrogen compounds, Oxides.

Under normal operation, the suit is pressurized to 0.5 inches of water pressure from the (Environmental control unit) air flow in conjunction with the suit pressure relief valves. When the suit is torn, it deflates and the air flow escapes through the hole. By placing a source of smoke just outside the hole, it will be blown away with no smoke entering that can be seen. This test shows that NO2-N2O4 vapors will enter the suit against this air flow out of the hole. In fact, it will enter the suit at such a high rate that any suit wearer who notices his suit has deflated because of a tear should go to a safe area and get out of that suit immediately. The suit still gives some protection to the wearer while leaving the area but the concentration inside the suit goes above safe limits almost immediately. The test shows the closer a tear occurs to the recirculation inlet of the ECU, the faster the concentration builds up in the helmet which receives most of the air flow from the ECU. The concentration at the tear was lower that at the head because of the high velocity of air going out of the tear from all directions around the tear. (Author)

AD-431 899 Div. 29
OTS price $1.10

Spacelabs, Inc., Van Nuys, Calif.
DYNAMIC MEASUREMENT OF PROTECTIVE MASKS.
Monthly progress rept. no. 7, 6 Jan-7 Feb 64. 7 Feb 64, 4p.
Contract DA18 108AMC228
Unclassified report

Descriptors: (*Protective masks, Instrumentation), Pressure regulators, Transducers, Environmental tests, Batteries & Components, Wiring diagrams, Processing, Hysteresis.

AD-431 930 Div. 29
OTS price $7.60

Western Regional Research Lab., Albany, Calif.
BULGUR WAFER AND ADJUNCTS FOR FALLOUT SHELTER RATIONS.
Rept. for Jul 62-Jun 63,
by Allan D. Shepherd, Darrell V. Beavers, Robert E. Ferrel, Robert J. Horvat and Hawkins Ng. Dec 63, 79p.
Contract OCD OS62 54
Unclassified report

Descriptors: (*Radioactive fallout, Shelters), (*Shelters, Food), (*Food, Civil defense systems), Wheat, Dehydrated foods, Costs, Storage, Stability, Degradation, Environmental tests, Odors, Chemical analysis, Chromatographic analysis, Taste, Packing materials, Vapors.

AD-432 011 Div. 29
OTS price $2.60

Naval Supply Research and Development Facility, Bayonne, N. J.
DEVELOPMENT AND EVALUATION OF AUTOMATIC SIPHONING SUBMARINE COFFEE URN,
by H. W. Richter, F. J. Vanderbeek, M. L. Mayer and J. Pardo. Aug 63, 22p.
Unclassified report

Descriptors: (*Kitchen equipment & supplies, Submarines), (*Coffee, Kitchen equipment & supplies), Design, Military requirements, Effectiveness.

A modified model of the prototype submarine coffee urn was developed and evaluated. It incorporated automatic siphoning, single-acting preset thermoswitches, and a new safety valve to eliminate boiler pressure relief and steam blow-off during normal brewing operations. The semi-automatic pour-over system incorporated into the design of the urn operated satisfactorily. It will eliminate the watch dog type of coffee brewing required with the prototype submarine coffee urn. The urn fulfilled the military specification requirement for extraction, while exhibiting improved pour-over and leaching temperatures, compared to the prototype urn. It was recommended that a low-water cut-off mechanism be incorporated into the design of the urn, in addition to an improved safety valve, to eliminate all blow-off steam into the gallery. (Author)

AD-433 079 Div. 29
OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
URINE EVACUATING SYSTEM FOR USE IN FULL-PRESSURE SUITS.
by Sidney T. Lewis and Leonard Harris. Mar 64, 9p.
Proj. 7750
SAM BTDR64 13 Unclassified report

Descriptors: (*Urine, Pressure suits), (*Pressure suits, Urine), Space biology, Protective clothing, Design, Collecting methods.

A urine elimination system was designed and tested for use with full-pressure suits. This device utilizes differential pressures as the main principle, causing the urine flow. The device was used on 19 flights in the low pressure chamber at altitudes varying from sea level to 75,000 feet without one failure. With minor modifications this device can be used on any space suit and is a practical, comfortable, economical means of removing urine from the suit. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-431 200 Div. 30, 5
OTS price $10.10

Mitre Corp., Bedford, Mass.
AN AIRBORNE COMMUNICATION SIMULATION (COMSIMP), by Irwin Shear. Feb 64, 122p. Rept. no. TM3844
Contract AF19 628 2390, Proj. 481L
ESD TDR63 493 Unclassified report

Descriptors: (*Communication systems, Simulation), (*Programming (Computers), Communication systems), Airborne, Aircraft, Antenna radiation patterns, Radio transmitters, Digital computers, Mechanical drawings, Air-to-air, Air-to-surface.

A program is presented which was written for the simulation of communication capability between two aircraft or between one aircraft and a ground station. The program considers aircraft geometry, antenna radiation patterns, and transmitter power. This program was written for the IBM 7090 Digital Computer using the FORTRAN symbolic language. The simulation contains three basic parts, each part containing its own group of subroutines. A block diagram of the program is given. (Author)

AD-431 251 Div. 30
OTS price $2.60

Burroughs Corp., Detroit, Mich.
GEMINI PROJECT PROGRAM PLAN FOR THE LAUNCH VEHICLE GUIDANCE COMPUTER.
23 Aug 62, rev. 17 May 63, 24p.
Contract AF04 695 28
Unclassified report

Descriptors: (*Computers, Design), (*Launch vehicles (Aerospace), Guidance), Research program administration, Scheduling.

The tasks in the work statement have been separated into a list of deliverable items, with the delivery dates for various critical items. Opposite each deliverable item there appears the appropriate test and procedure. These procedures will be submitted to Aerospace for approval prior to their use for acceptance purposes. A series of milestone charts show schedules for Tasks 1 through 8 of the Statement of Work and Subsequent communications. (Author)

AD-431 552 Div. 30
OTS price $18.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2). VOLUME VII. THE SYSTEM CIRCUIT SCHEMATICS. SECTIONS 2 THROUGH 13.
Final rept.
23 Sep 63, 299p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 7, Sect 2-13
Unclassified report

Descriptors: (*Computers, Circuits), Computer logic, Search theory, Machine translation, Reading machines, Pattern recoginition, Data processing systems, Networks, Control systems, Input-output devices, Pulse amplifiers, Pulse transmitters, Gates (Circuits), Pulse generators, Punched cards, Power supplies, Film readers, Trigger circuits.

AD-431 553 Div. 30
OTS price $9.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2) VOLUME VI. THE SYSTEM LOGIC DIAGRAMS.
Final rept.
23 Sep 63, 114p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 6, Sect 4 and 5
Unclassified report

Descriptors: (*Computers, Input-output devices), (*Computer logic, Circuits), Data processing systems, Networks, Control systems, Machine translation, Photographic printers, Reading machines, Pattern recognition.

AD-431 554 Div. 30
OTS price $5.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2) VOLUME V. THE SYSTEM TECHNICAL DESCRIPTION SECTION 7: FILM PRINTER.
Final rept.
23 Sep 63, 54p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 5, Sect. 7
Unclassified report

Descriptors: (*Computers, Input-output devices),(*Photographic printers, Pictures), Data processing systems, Networks, Control systems, Machine translation, Circuits, Reading machines, Pattern recognition.

AD-431 555 Div. 30
OTS price $5.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2) VOLUME V. THE SYSTEM TECHNICAL DESCRIPTION. SECTION 6: POWER SUPPLIES AND SEQUENCING.
Final rept.
23 Sep 63, 53p.
Contract AF30 602 2080, Proj. 4599 Task 45990
RADC TDR63 100, vol. 5, Sect. 6
Unclassified report

Descriptors: (*Computers, Input-output devices), (*Programming (Computers), Power supplies), Data processing systems, Networks, Control systems, Machine translation, Circuits, Sequences, Search theory, Reading machines, Pattern recognition.

AD-431 556 Div. 30
OTS price $1.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2) VOLUME V. THE SYSTEM TECHNICAL DESCRIPTION SECTION 8: Q-PAC TESTER.
Final rept.
23 Sep 63, 13p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 5, sect. 8
Unclassified report

Descriptors: (*Computers, Circuit testers), Circuits, Data processing systems, Search theory, Reading machines, Machine translation, Pattern recognition, Networks, Computer logic, Control systems, Switching circuits, Input-output devices.

AD-431 559 Div. 30
OTS price $5.60.

David Taylor Model Basin, Washington, D. C.
A TRANSISTORIZED EXPANDED TRANSLATOR FOR THE UNIVAC MOD 407 CARD-TO-TAPE CONVERTER,
by H. Lee Hancock, Jr. Dec 63, 52p.
DTMB 1768 Unclassified report

Descriptors: (*Input-output devices, Circuits), Computer logic, Networks, Design, Programming (Computers), Data processing systems, Punched cards, Magnetic tape.

This report summarizes the design, development, and construction of a Transistorized Translator to expand the Mod 407 Remington Rand Card-To-Tape Converter (48-character format) to a full 63-character format converter. The logical design, circuit design, and construction as well as the additional circuitry required for the comparison module aredescribed and discussed. Now in full operation, this expanded translator is giving reliable, maintenance-free service in the Applied Mathematics Laboratory of the David Taylor Model Basin. (Author)

AD-431 570 Div. 30
OTS price $9.10

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2). VOLUME III. THE SYSTEM ORGANIZATION.
Final rept.
23 Sep 63, 106p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 3 Unclassified report

Descriptors: (*Computers, Input-output devices), (*Machine translation, Programming (Computors)), Reading machines, Networks, Pattern recognition, Computer logic, Control systems, Data processing systems.

A description is given of the over-all system organization of the AN/GSQ-16 (XW-2) Automatic Translation System. The data handling and processing requirements for the realization of an effective automatic language processing system, and the processing capabilities of the translation system, are briefly discussed. The complete instruction set together with the corresponding machine interpretation is followed by a detailed discussion of the machine instruction set constituting the unique table look-up lexical data processing capability. Both the single-pass and multipass operating modes of the translation system are explained. This includes a description of the Sentence Analyzer Memory and indexing arithmetic, the input text loading operation, the Photostore integral and conditional addressing philosophy and the Photosre search procedure, the Search Input State operations associated with the analysis and processing of source-language data, the Process State operations associated with the analysis and processing of intermediate data, and the output operations associated with the readout of the English translation and subsequent photocomposing procedure. There is also a description of various operational and experimental system provisions. The final section deals with procedures utilized to maximize the system reliability. (Author)

AD-431 571 Div. 30
OTS price $16.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2). VOLUME V THE SYSTEM TECHNICAL DESCRIPTION SECTION 2: SEARCH AND ANALYSIS LOGIC.
Final rept.
23 Sep 63, 259p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 5, sect. 2
Unclassified report

Descriptors: (*Computers, Networks), (*Machine translation, Programming (Computers)), Computer logic, Data processing systems, Search theory, Input-output devices, Pattern recognition, Reading machines, Programming languages, Circuits, Pulse transmitters, Gates (Circuits), Errors.

AD-431 572 Div. 30
OTS price $14.00

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2). VOLUME II. THE LINGUISTIC APPROACH.
Final rept.
23 Sep 63, 203p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100 vol. 2 Unclassified report

Descriptors: (*Programming language, Machine translation). (*Machine translation, Vocabulary). Classification, Printing, Input-output devices, Automatic, Computers.

The volume contains a description of the current status of machine translation work at IBM. The work is broken down into three separate areas: the Russian Master Dictionary, the bidirectional translation system, and the multipass translation system. The dictionary description contains an explanation of the various types of entries encountered in the dictionary, such as true stems, long stems and stems with endings, phrases with internal and external inflection, and full forms. The Russian and English morphological classifications and the derivational capabilities of the dictionary are explained. The dictionary contains 155, 000 entries. The bidirectional translation program is explained from both the linguistic and the programming standpoints. The program, when used with the Russian Master Dictionary, is capable of translating randomly selected texts. The translation is accomplished in a single left-to-right pass by analyzing the immediate neighbors of words. The multipass translation program is described pass-by-pass. The program consists of 16 passes, some right-to-left, others left-to-right. (Author)

AD-431 573 Div. 30, 32
OTS price $10.50

Mitre Corp., Bedford, Mass.
FIRST CONGRESS ON THE INFORMATION SYSTEM SCIENCES. SESSION 1: CONCEPTS OF INFORMATION.
Feb 64, 135p. Rept. no. MITRE SS1
Contract AF33 600 39852, Proj. 704
ESD TDR63 474 1 Unclassified

Descriptors: (*Communication theory, Reviews), (*Symposia, Communication theory), Documentation, Control systems, Coding, Data processing systems, Information retrieval, Digital computers, Errors, Probability, Control, Design, Operation.

AD-431 574 Div. 30
OTS price $9.10

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2). VOLUME I. THE MARK II LANGUAGE PROCESSING SYSTEM.

Final rept.
23 Sep 63, 110p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 1 Unclassified report

Descriptors: (*Machine translation, Reviews), (*Computers, Pictures), Networks, Circuits, Data processing systems, Control systems, Reading machines, Pattern recognition.

AD-431 575 Div. 30, 24
OTS price $3.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2). VOLUME V. THE SYSTEM TECHNICAL DESCRIPTION. SECTION 9: AN AUTOMATIC PROCESSOR FOR PHOTOGRAPHIC STORAGE DISCS.
Final rept.
23 Sep 63, 36p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 5, sect. 9
Unclassified report

Descriptors: (*Computers, Data storage systems), (*Computer storage devices, Photographic plates), Data processing systems, Machine translation, Control systems, Photographic equipment, Input-output devices, Reading machines, Pattern recognition.

AD-431 577 Div. 30
OTS price $17.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SER AN/GSQ-16 (XW-2) VOLUME VII. THE SYSTEM CIRCUIT SCHEMATICS.
Final rept.
23 Sep 63, 273p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol 7, sect. 1
Unclassified report

Descriptors: (*Computers, Circuits), (*Machine translation, Networks), Data processing systems, Reading machines, Pattern recognition, Control systems, Input-output devices, Punched cards, Computer logic, Pulse generators, Delay lines.

AD-431 583 Div. 30
OTS price $4.60

RCA Defense Electronics Products, New York.
CODE CONVERTER STUDY.
Final rept.,
by H. Landerer. 31 Aug 61, 48p. Rept. no. CR61 419 19
Task B2051 0242
ESD TDR64 225 Unclassified report

Subcontract to ITT Communications Systems, Inc., Paramus, N. J.

Descriptors: (*Computers, Programming (Computers)), Semiconductors, Design, Circuits, Computer logic, Reviews.

This report covers the findings of a study which was devoted to arriving at recommendations for a low-cost, small-size converter for use in the 480-L system. The investigation was concerned with conversion between Baudot and Fieldata; but the technical conclusions developed are applicable to other code schemes. Several semiconductor code converter designs are presented that employ a minimum of semiconductor equipment. These designs are analyzed in terms of quantity of equipment necessary for implementation. One design, the Hybrid 2 x 4 method, is shown to be best. This design employs 50 gates using a total of 312 inputs to the gates. An analysis of parametron application to code conversion is presented, and a design method using parametrons is indicated. The design of a Baudot to Fieldata code translator using parametrons, built and tested at RCA in November, 1960 is described. An evaluation is made of the relative advantages of the best of the analyzed semiconductor and parametron designs. The parametron design was found to be less expensive, in general more flexible, and lighter and smaller in size. (Author)

AD-431 587 Div. 30
OTS price $12.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2). VOLUME V THE SYSTEM TECHNICAL DESCRIPTION. SECTION 3: SENTENCE ANALYZER MEMORY.
Final rept.
23 Sep 63, 171p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100 vol. 5, sect. 3
Unclassified report

Descriptors: (*Computer storage devices, Reading machines). (*Reading machines, Networks), Programming language, Pattern recognition, Computers, Data storage systems, Data processing systems, Control systems, Input-output devices, Machine translation, Circuits, Computer logic, Programming (Computers), Control sequences.

AD-431 656 Div. 30
OTS price $10.50

Thomas J. Watson Research Cnter, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2). VOLUME V. THE SYSTEM TECHNICAL DESCRIPTION. SECTION 1: PHOTOSTORE.
Final rept.
23 Se 63, 132p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 5, sect. 1
Unclassified report

Descriptors: (*Computers, Data storage systems), (*Thin films (Storage devices), Photographic emulsions), Real-time, Circuits, Networks, Machine translation, Reading machines, Pattern recognition, Input-output devices, Data processing systems, Search theory, Programming (Computers), Computer storage devices, Punched cards, Pulse amplifiers, Errors.

The Disc Readed is the central novel unit of the AN/GSQ-16 (XW-2) equipment. In it a disc which has been loaded with 64.5 x 10 to the 6th power bits of information is read on instruction from the Search and Analysis Logic. The input to the Disc Reader consists of a long sequence of characters in which words or groups of words are indicated. These constitute the ''addresses'' in the computer sense and serve as a basis for a search. When an address is found, the associated ''translation'' is read out and is delivered via the Search and Analysis Logic to the output equipment. A description is presented of the information rate required for a real-time translation of Russian technical literature and the particular optical, servo and detection components that were designed to deliver it at this rate in a form acceptable to the Searching and Analysis Logic. (Author)

AD-431 657 Div. 30
OTS price $10.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2) VOLUME V THE SYSTEM TECHNICAL DESCRIPTION SECTION 4: OUTPUT CONTROL UNIT,
Final rept.
23 Sep 63, 134p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 5, Sect. 4.
Unclassified report

Descriptors: (*Computers, Control systems), (*Input-output devices, Control systems), (*Control systems, Design), Circuits, Reading machines, Networks, Pattern recognition, Machine translation, Computer logic, Data processing systems.

AD-431 658 Div. 30
OTS price $10.10

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2). VOLUME IV. THE REFERENCE MANUAL FOR LEXICOGRAPHERS.
Final rept.
23 Sep 63, 126p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 4 Unclassified report

Descriptors: (*Computers, Programming computers), (*Programming languages, Dictionaries), (*Documentation, Handbooks, (*Machine translation, Programming (Computers)), Errors, Reading machines, Pattern recognition, Computer logic, Control systems, Data processing systems, Input-output devices, Search theory.

This volume is a self-contained source of information about programming the Mark II Translator. Although Russian-to-English translation is emphasized in the programming examples, the techniques and procedures are equally applicable to the solution of other linguistic problems. The presentation is sufficiently general and complete to enable a lexicographer to originate a program for language processing and to embody his program in a practical dictionary. (Author)

AD-431 659 Div. 30
OTS price $13.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2). VOLUME VI. THE SYSTEM LOGIC DIAGRAMS.
Final rept.
23 Sep. 63, 192p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, vol. 6, Sect. 1-3.
Uuclassified report

Descriptors: (*Computers, Circuits), (*Computerlogic, Networks), Reading machines, Pattern recognition, Machine translation, Control systems, Data processing systems, Input-output devices, Search theory.

AD-431 667 Div. 30, 8
OTS price $2.60

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
RADIO FREQUENCY PARAMETERS AND CRITERIA FOR INSTRUMENTATION TIMING.
Jan 64, 30p.
IRIG 105 63 Unclassified report

Descriptors: (*Ranges (Establishments), Radiofrequency interference), (*Radiofrequency interference, Specifications), Radiofrequency spectroscopy, Design, Instrumentation, Timing devices, Communication equipment, Very high frequency, Radio transmissions.

Parameters are presented which provide development and coordination agencies with design specifications on which to base equipment development and modification in an effort to insure interference-free operation for all concerned and efficient utilization of the radio frequency spectrum as related to instrumentation timing systems. Wasteful use of the spectrum by any system using electromagnetic radiation and reception can have far-reaching effects in many phases of military and civilian activities. It is emphasized that these parameters and criteria are proposed for application at military test ranges where congestion of portions of the usable frequency spectrum is already a severe problem. It is hoped that these same principles will be applied to other fields outside the scope of instrumentation systems. These parameters and criteria are designed to be applicable to the standard timing formats devised by the Tele-Communications Working Group (TCWG) of the Inter-Range Instrumentation Group (IRIG) and accepted by the Steering Committee on 8 August 1960 as IRIG Document Number 104-60. (Author)

AD-431 735 Div. 30
OTS price $26.00

Research Triangle Inst., Durham, N. C.
ANALYSIS OF SURVEY DATA.
Final rept., pt. 2,
by E. L. Hill, W. K. Grogan, R. O. Lyday and H. G. Norment. 15 Feb 64, 551p. Rept. no. R OU81 pt. 2
Contract OCD OS62 144
Unclassified report

Descriptors: (*Computers, Programming (Computers)), (*Civil defense systems, Structural parts), Input-output devices, Shelters, Tables, Buildings, Construction, Errors, Shielding, Floors, Roofs, Radiation hazards, Water, Structures, Dosage.

These appendices contain details of computer programs used in categorization of structures with respect to technical shielding characteristics and resultant tabulations (A-E); details of the RTI 33 NFSS phase 1 building sample selection method (F); an illustration of procedures used in identifying building elements critical to PF computations (G); RTI computational method and forms used in making Engineering Manual PF calculations for the 33 sample buildings (H); descriptions of the 33 buildings, the five PF results (AE Phase 1 and 2, RTI FOSDIC with and without partitions, and Engineering Manual), and analyses of individual building input and procedural differences judged to have affected the PF differences (I); construction details of four buildings used in comparing experimental and calculated PF's (J); trapped potable water field data gathered in the 33 building survey (K); detailed analyses of Technical Operations Research reports that affect teh procedures used to calculate PF's (L-N); a summary of conclusions and recommendations made by Technical Operations Research and concurred with by RTI)O); and detailed recommended modifications to the NBS-NFSS Computer Program (P). (Author)

AD-431 746 Div. 30, 8, 12
OTS price $4.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B(MINUTEMAN). GENERAL TEST PLAN MISSOURI TEST PROGRAM VOLUME

III, PART B, SECTION 3 (HARDENED ANTENNA AND RADIO SUBSYSTEM INTEGRATION TESTS).
24 Feb 64, 45p. Rept. no. MPO PD0006, Sec 3, rev. 2
Contract AF04 594 261
Unclassified report

Rept. no. MPO PD0006, Sec. 3, Rev. 2 supersedes Rept. no. MPO PD 0906, Vol. 3, pt. B, dtd 15 May 63.

Descriptors: (*Ground support equipment, Radio equipment), (*Radio equipment, Performance (Engineering)), (*Antennas, Performance (Engineering)), (*Guided missiles (Surface-to-surface), Ground support equipment), Reliability (Electronics), Instrumentation, Test methods, Data processing systems, Measuring devices (Electrical and electronic).

This document conatins the detailed test plan for the Integration and Evaluation of the Radio Subsystem and Hardened Antenna Configuration at the Warrensburg and Norborne, Missouri Test Sites. This work is being done as a part of the R&D Program for the Ground Electronics System for WS-133B (Minuteman). (Author)

AD-431 765 Div. 30, 25
OTS price $1.60

Hammond Metallurgical Lab., Yale U., New Haven, Conn.
COMPUTER PROGRAMS FOR THE ANALYSIS OF POSITIONS AND PROFILES OF X-RAY POWDER PATTERNS,
by E. N. Aqia. Oct 63, 19p. Rept. no. TR7
Contract Nonr60943
Unclassified report

Descriptors: (*Programming (Computers), X-ray diffraction analysis), Powders, Refractometers, Input-output devices, Fourier analysis, Diffraction, Cameras, Geometry, Intensity, Line spectrum.

Computer programs have been written for the analysis of x-ray diffraction powder pattern peaks. The K-alpha sub 1 component peak is resolved by the Rachinger method. The observed peak intensities are corrected for background level counts, scattering factor and Lorentz-Polarization factor before the calculations of the total diffracted intensity, the center of gravity and the variance of the peak, and the position of peak maximum are made. A Fourier analysis of the peak profile is performed, and the instrumental broadening is eliminated by the analytical method of Stokes. (Author)

AD-431 777 Div. 30
OTS price $2.60

IIT Research Inst., Chicago, Ill.
SELF ORGANIZING NETWORKS.
Annual rept., 15 Feb 63-15 Feb 64.
15 Feb 64, 28p.
Contract Nonr339200, IITRI Proj. H154
Unclassified report

Descriptors: (*Computers, Pattern recognition), (*Artificial intelligence, Networks), Computer logic, Input-output devices, Search theory, Programming (Computers).

The report summarizes the program in the development of pattern recognition automata (logical networks) with the ability to adjust their internal logical structure based on experience in a problem environment. The current research is concerned with collections of individually fixed automata, which are regarded as a species. The adaptation or change takes place not within particular individual automata, but in terms of an evolutionary process which carries the species into harmony with its environment. The general observations which led to the present approach are outlined. The evolutionary model is described in detail. Some of the possible applications of an evolutionary search and some of the preliminary results are outlined. (Author)

AD-431 842 Div. 30, 15
OTS price $8.60

Aerospace Corp., Los Angeles, Calif.
CASCADED BINARY ERROR CODES. PART 2. DECODING ALGORITHM FOR COMPONENT CODES,
by W. Altar. 21 Oct 63, 97p. Rept. no. TDR169 3250 42TN2
Contract AF04 695 169
SSD TDR63 259 Unclassified report

Descriptors: (*Programming (Computers), Errors), (*Digital computers, Control systems), (*Computers, Optimization), Programming languages, Input-output devices, Networks, Probability, Cascade structures, Combinatorial analysis, Conformal mapping.

Cascading of well-behaved group codes of moderate size, such as the Golay codes and some Hamming codes, permits the generation of codes of large overall size which can be stepwise decoded using the exhaustive and convenient decoding algorithms of tthe component codes. Decoders for Hamming codes are well known. For the Golay (23, 12) code, an expedient and exhaustive algorithm requiring in the order of two matrix multiplications on the average for 23 digits is presented. This code permits correction of all errors of multiplicities 1, 2, 3. Procedures for listing all compatible quadruple errors in cascaded Golay codes are presented. An SDS 920 all-purpose digital computer has been programmed to (a) instrument the Golay (23, 12) decoding algorithm and (b) execute a statistical survey of 80 different implementations of the algorithm, including computation of performance parameters. (Author)

AD-431 881 Div. 30
OTS price $2.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-2). VOLUME V THE SYSTEM TECHNICAL DESCRIPTION SECTION 5: OPERATOR AND MAINTENANCE CONSOLE.
Final rept.
23 Sep 63, 29p.
Contract AF30 602 2080, Proj. 4599, Task 45990
RADC TDR63 100, Vol. 5, Sect. 5
Unclassified report

Descriptors: (*Operator (Personnel), Computers), (*Maintenance equipment, Computers), Computer storage devices, Input-output devices, Operation, Test methods.

AD-432 038 Div. 30
OTS price $14.00

Lincoln Lab. Mass. Inst. of Tech., Lexington.
THE BASEBALL PROGRAM: AN AUTOMATIC QUESTION-ANSWERER. VOLUME I,
by A. K. Wolf, C. S. Chomsky and B. F. Green, Jr.
11 Apr 63, 209p. Technical rept. no. 306
Contract AF19 628 500
ESD TDR63 586 Unclassified report

Descriptors: (*Data storage systems, Computers), (*Computers, Data storage systems), Computer storage devices, Information retrieval, Punched cards, Dictionaries, Programming (Computers), Documentation.

Baseball is a computer program that answers questions posed in ordinary English about baseball data stored in the computer. The program combines linguistic analysis with data retrieval and processing. A question is read into the computer from punched cards and the words and idioms are looked up in a dictionary. The dictionary definitions are used to analyze the question's syntactic structure and semantic content. A specification list is formed symbolizing the relevant information to be retrieved and the processing to be done to answer the question. A search process utilizes the specification list to extract the relevant information from the data and to organize the result for further processing where needed. The baseball data, which are stored hierarchically, consist of the month, day, place, teams and scores for games played in the American League in 1959. This report describes the Baseball Program in detail and explains the programming procedures and algorithms that were used in each section of the program. Volume II includes flow diagrams of all major routines in the program and some results of the program's use, as well as further documentation. (Author)

AD-432 041 Div. 30, 8
OTS price $4.60

Goodyear Aircraft Corp., Akron, Ohio.
STUDY OF ELASTIC SWITCHING FOR ASSOCIATIVE MEMORY SYSTEMS.
Final rept.,
by R. T. Hunt, D. L. Snider, J. Suprise and H. N. Boyd. Feb 64, 50p.
Contract AF30 602 3103, Proj. 5581, Task 558108
RADC TDR63 483 Unclassified report

Descriptors: (*Computer storage devices, Electronic switches), (*Magnetic core storage, Computer storage devices), Ferrites, Time, Computer logic, Electric potential, Temperature, Electric currents, Signal-to-noise ratio, Magnetic cores, Test methods, Stability.

Various ferrite materials were tested for elastic switching properties that will increase the speed of associative memory systems. Elastic switching utilizes high-amplitude, narrow-width (50 nsec) read-pulses that permit nondestructive readout. Because of the nondestructive readout, the exclusive-or function can be obtained within the memory. The S/N ratios, output voltages, and maximum speed of operation were studied for various temperatures, bias currents, and read-current drive requirements. Several materials had S/N ratios higher that 2 to 1 in operation under nominal conditions. Changes in temperature up to 70 C did not impair the elastic switching properties. Output voltages varied linearly and in proportion to changes in temperature, approximately 20 percent for most materials for a change from room temperature to 70 C. The S/N ratios were fairly constant to 70 C. The maximum speed of operation was determined as 10 x 10 to the 6th power interrogations per second. The optimum size of an elastic switching memory was also considered. (Author)

AD-432 049 Div. 30, 25, 14
OTS price $1.60

Airborne Instruments Lab., Inc., Deer Park, N. Y.
SOLID-STATE FERROELECTRIC ACCELEROMETER.
Interim rept. no. 1, 4 Nov 63-4 Feb 64,
by M. L. Wright and M. M. Freundlich. 26 Feb 64, 16p.
Contract NOw64 0093c
Unclassified report

Descriptors: (*Accelerometers, Materials), Epoxy plastics, Silicone plastics, Barium compounds, Titanates, Ammonium compounds, Phosphates, Hydrogen compounds, Crystals, Optical phenomena, Digital systems, Lasers, Photoelasticity, Ferroelectric crystals, Stresses.

Various promising plastic and crystalline materials were collected, and a fixture for testing the materials was built. The design of a suitable sample holder has been started for a fringe-counting readout system. A coherent-light digital-readout system was investigated, and the inherent advantages of this system are discussed. At present, a suitable source for this system is not available. (Author)

AD-432 146 Div. 30, 15, 28
OTS price $1.60

Michigan U., Coll. of Literature Science and the Arts, Ann Arbor.
THE THEORY OF ALGERBRAIC AUTOMATA I. MORPHISMS AND REGULAR SYSTEMS,
by Yehoshafat Give'on. Jan 64, 20p. Rept. no. 05662 03105 27T
Contracts Nonr122421, DA31 124ARO D G433, ORA Projs. 03105, 05662
AROD 4049 4 Unclassified report

Descriptors: (*Mathematical logic, Algebraic topology), (*Computers, Computer logic), Algebras, Groups (Mathematics), Artificial intelligence, Reading machines, Control systems, Programming languages.

This is a preliminary report on a study of an algebraic generalization of the concept of regular events. Among all the possible ways of generalization the one suggested by the characterization of regular events by means of homomorphisms with finite ranges was chosen. Following this suggestion, attention is directed to the study of homomophisms of monoids and their effect on subsets of monoids. Furthermore, a general algebraic framework is suggested in which several and various domains in the area of automata theory (like finite-state transductions, commutative machines, and context-free languages) can be studied and generalized uniformly. In this report, the study of the basic and immediate properties of regular systems in monoids and the effect of homomorphisms on such systems are presented. (Author)

AD-432 169 Div. 30, 28
OTS price $9.60

MITRE Corp., Bedford, Mass.
FIRST CONGRESS ON THE INFORMATION SYSTEM SCIENCES. SESSION 4. JOINT MAN-COMPUTER DECISION PROCESSES.
Feb 64, 118p. Rept. no. SS4
Contract AF33 600 39852, Proj. 704
ESD TDR63 474 4 Unclassified report

Descriptors: (*Data processing systems, Decision making), (*Decision making, Data processing systems), Analysis, Operation, Selection, Computers.

This report is concerned with decision-making which involves choosing one of a number of alternatives after simultaneously evaluating the several characteristics which distinguish the alternatives. Contained herein are the results of experiments conducted with human subjects to determine how decision-making performance varies with the number of characteristics presented in a complex decision problem. Decision quality and decision time were the two aspects of performance measured. With unlimited decision time, increasing the number of characteristics did not increase decision quality. With limited decision time, increasing the number of characteristics decreased decision quality. (Author)

AD-432 229 Div. 30
OTS price $4.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
EVALUATION OF HIGH TEMPERATURE INSTRUMENTATION FOR DYNAMIC ANALYSIS. ENCAPSULATED STRAIN GAGE INSTALLATION FOR USE IN STEAM ENVIRONMENT,
by S. Tolotta. 26 Feb 64, 49p.
Proj. A384, Task SF013 06 20 Subtask 3950
Unclassified report

Descriptors: (*Strain gages, Steam), (*Boilers, Instrumentation), Seals (Stoppers), Installation), Welds, Encapsulation, Fracture (Mechanics), Thermal stresses, High temperature research.

An inspection of the interior of a steam drum aboard the USS DECATUR revealed a crack extending around the upper half of the manway. The stresses causing the failure were thought to be highly concentrated; therefore, it was necessary to use a strain gage with a short gage length (1/8 in) that could operate in a saturated steam atmosphere at 1200 psig. Because there were no known cements or protective coatings which were capable of operation in the proposed environment, it was necessary to develop a special gage installation. The unit developed consisted of a strain gage cemented atop a stainless steel shim which had been tack welded to the test specimen and then sealed by silver soldering. This type installation was capable of meeting the requirements. Detailed instructions for construction, installation and calibration are described in appendixed Instrument Standards. (Author)

AD-432 286 Div. 30, 25, 9
OTS price $6.60

Brown Engineering Co., Huntsville, Ala.
A FORTRAN SUBROUTINE FOR CALCULATING THE THERMODYNAMIC PROPERTIES OF EQUILIBRIUM AIR,
by G. R. Guinn and J. G. Floyd. Nov 63, 62p.
Rept. no. TN R79
Unclassified report

Descriptors: (*Computers, Language), (*Air, Thermodynamics), (*Thermodynamics, Air), (*Programming languages, Thermodynamics), Programming (Computers), Fluid flow, Computer logic, Equations, Fluid dynamic properties.

This report describes an IBM 7040 FORTRAN computer subroutine for calculating the approximate thermodynamic properties of equilibrium air. Electron concentrations at the high and intermediate density ranges are obtained from curve fits of more precise calculations. A copy of the program may be obtained from the Scientific Programming Library, Program No. SP-5. (Author)

AD-432 308 Div. 30, 32
OTS price $1.60

RAND Corp., Santa Monica, Calif.
LINGUISTIC AND NON-LINGUISTIC ''UNDERSTANDING'' OF LINGUISTIC TOKENS,
by D. M. MacKay. Mar 64, 17p. Rept. no. RM3892PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Language, Programming (Computers)), (*Programming language, Information retrieval), Test methods, Models (Simulations), Computers, Tests.

The distinction is explored between recognizing an utterance as a 'symptom' of the state of affairs in or confronting its originator and as a linguistic tool. It is suggested that although only the first kind of understanding is required to enable a computer to accept data and answer questions in verbal form, such ability is no guarantee of its comprehension of all aspects of language to attain full linguistic comprehension, the program must also embody at least a 'skeleton representation' of the linguistic context in which an utterance originates and from which it derives its linguistic significance as a goal-directed operator. By use of this richer model of its situation, a computer should be enabled to meet more sensitive tests of linguistic comprehension. (Author)

AD-432 312 Div. 30, 32
OTS price $3.60

ITT Communication Systems Inc., Paramus, N. J.
SELECTIVE RETRIEVAL FROM A VARIABLE LENGTH INFORMATION FILE.
Final rept.,
by I. L. Isert. 1963, 35p. Rept. no. 12390 03 01
Contract AF19 626 5, Task PG1008 0306
ESD TDR64 226 Unclassified report

Subcontract to C-E-I-R, Inc.

Descriptors: (*Information retrieval, Selection), (*Computer logic, Information retrieval), Digital computers, Data processing systems, Design, Costs.

This final report describes in detail the modification to the ICS Variable Length Information Processing Program to include the option of logical file item selectivity. Selective retrieval adds another dimension to the already powerful information processing program. The ICS engineering design of the selection procedure is based on the postulates of Boolean algebra. This represents a unique and useful approach to the manner of specifying criteria for selectivity. (Author)

AD-432 326 Div. 30, 32
OTS price $1.10

RAND Corp., Santa Monica, Calif.
NEW AREAS OF APPLICATION OF COMPUTERS,
by Allen Newell. 21 Nov 60, 4p. Rept. no. P2142
Unclassified report

Descriptors: (*Computers, Theory), (*Scientific research, Computers), (*Commerce, Data processing systems), Engineering, Music.

AD-432 330 Div. 30, 28
OTS price $1.60

RAND Corp., Santa Monica, Calif.
TOWARD INTELLIGENT MACHINES,
by J. D. Williams. 29 Dec 60, 13p. Rept. no. P2170
Unclassified report

Descriptors: (*Artifical intelligence, Reasoning), (*Brain, Stimulation), (*Nerve cells, Simulation), Theory, Design, Analysis, Effectiveness.

AD-432 331 Div. 30
OTS price $3.60

RAND Corp., Santa Monica, Calif.
THE PRESENT STATUS OF NONLINEAR PROGRAMMING,
by P. Wolfe. 12 Jan 61, 32p. Rept. no. P2181
Unclassified report

Paper presented at Symposium on Mathematical Optimization Techniques, Santa Monica, California 18 Oct 60.

Descriptors: (*Nonlinear systems, Programming

(Computers)), (*Programming (Computers), Nonlinear programming), Mathematical analysis.

A survey is undertaken of the so-called 'primal' and 'Lagrangian' methods for the solution of the convex, non-discrete mathematical programming problem. (Author)

AD-432 389 Div. 30
OTS price $4.60

Uppsala U. (Sweden).
REFFERENCE MANUAL FOR EASY. AN AUTOMATIC PROGRAMMING SYSTEM FOR THE ALWAC COMPUTER,
by Klaus Appel. 1 Oct 63, 48p. Scientific rept. no. 3; Preprint no. 108
Contract AF61 052 701
ARL 64 48 Unclassified report

Descriptors: (*Instruction manuals, Programming (Computers)), (*Programming (Computers), Instruction manuals), (*Programming (Computers), Mathematics), Data processing systems, Input-output devices, Control systems, Operation, Design, Coding, Test methods, Numerical analysis, Data storage systems, Electronic equipment, Programming language.

AD-432 493 Div. 30
OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DATA SYSTEMS.
Quarterly progress rept.,
by F. C. Frick and S. H. Dodd. 31 Jan 64, 24p.
Contract AF19 628 500
ESD TDR64 31 Unclassified report

Descriptors: (*Data processing systems, Design), Digital computers, Computer storage devices, Circuits, Magnetic tape, Thin films (Storage devices), Analog-to-digital converters, Psychology, Bionics, Transistors, Theory.

AD-432 844 Div. 30, 18, 15
OTS price $10.50

Cook Electric Co., Morton Grove, Ill.
DEVELOPMENT OF TECHNIQUES FOR PREDICTION OF SYSTEM EFFECTIVENESS.
Final rept.,
by T. J. Horrigan. 28 Feb 64, 133p.
Contract AF30 602 2718, Proj. 5519, Task 551902
RADC TDC63 407 Unclassified report

Descriptors: (*Armed forces operations, Simulation), (*Defense systems, Effectiveness), Mathematical models, Programming languages, Computers, Computer logic, Mathematical prediction, Reliability, Maintainability, Programming (Computers).

The broad problem of the prediction of system effectiveness is investigated with the objective of determining the kind of mathematics, mathematical models of mathematical procedures capable of supporting a significant amount of the required applications. Special attention is given to those problem areas in which the computation of effectiveness indices can not exclude consideration of reliability and maintainability. For such problems it is concluded that feasible solutions, capable of the timely and economical generation of needed results, exist only in terms of hybrid Monte-Carlo and analytical simulation programs for digital computers (requiring, in some cases, minor analog support) which must be generated by the computer itself by virtue of a compiler type automatic programming language. The existing languages are investigated and found unsuitable because of lack of suitable logic, protracted programming time or lack or usability by other than specially trained professional programmers. Some of the difficulties encountered are demonstrated by the construction of a working program for the prediction of system effectiveness for a simple system for which reliability and maintainability are considered. Suggestions for the structure of a suitable language are set forth. (Author)

AD-432 847 Div. 30
OTS price $2.60

Space Sciences Lab. U. of Calif., Berkeley.
THE RUBIDIUM VAPOR MAGNETOMETER AS A VECTOR INSTRUMENT FOR RECORDING MICROPULSATIONS.
by R. E. Warren. 5 Dec 63, 23p. Series No. 4, Issue No. 87
Contract Nonr222 89
Unclassified report

Descriptors: (*Magnetometers, Rubidium), Magnetic fields, Vapors, Earth, Test methods, Coils, Circuits.

To study the induction effects of time variations in the earth's magnetic field, it is common, and desirable, to measure all three components of the field. A semiquantitative investigation of the induction effects of micro-pulsations was carried out using only vertical component observations. This paper is a discussion of the use of a scalar field magnetometer to measure the vertical component exclusively. The field procedure for using these A-meters and the possibility of expanding the system to a three component device are also considered. (Author)

AD-432 863 Div. 30
OTS price $1.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
DATA REDUCTION BY COHERENT OPTICAL SYSTEMS,
by A. Vanderlugt and F. B. Rotz. May 64, 21p.
Rept. no. 4594 40R
Contract AF33 616 8433
Unclassified report

Descriptors: (*Data processing systems, Spectroscopy), Photographic recording systems, Optical analysis, Coherent scattering, Interferometers, Photographic film, Computer logic, Filters (Electromagnetic), Lenses, Data, Reduction.

Coherent optical systems are useful in performing two major operations in data reduction: spectral analysis and linear filtering. The latter operation includes convolution, autocorrelation, and cross correlation. In this paper we will emphasize some new developments which have bearing on data reduction, while referring only briefly to the theory behind coherent optical systems. Of particular interest is the development of a technique which allows more general operations by linear filtering. Examples of spectrl analysis and character recognition will be presented. (Author)

AD-432 882 Div. 30
OTS price $3.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
HIGH-PRECISION PRESSURE SENSOR.
Quarterly progress rept. no. 13, 8 Nov 63-7 Feb 64,
by Lewis G. Anderson, William H. Crabtree, Theodore J. Cruise and Edward J. McKay, Jr. Feb 64, 37p. Rept. no. OR194; DSR 8684
Contract NOw61 0400 Unclassified report

Descriptors: (*Pressure gages, Sound transmission), (*Pressure, Measurement), Sound, Liquids, Velocity, Coupling circuits, Relaxation oscillators, Tests, Stability, Waveguides, Circuits, Transistors, Trigger circuits.

Efforts were continued on the development of a zero to 2500 psi pressure sensor having an overall precision of 1/4 psi. Present emphasis is on developing a practical instrument based on a velocity of sound technique whose feasibility was demonstrated in earlier work. Newly designed echo selector and detector-transmit coupling circuitry is described and test results presented. Results of an experimental study of the effect of several sound path design parameters on the current status of the project is presented. (Author)

AD-432 902 Div. 30
OTS price $1.60

Laboratories for Research and Development Franklin Inst., Philadelphia, Pa.
CONDENSER TILTING DEVICE FOR DIFFRACTED BEAM MICROSCOPY IN THE RCA-EMU3 ELECTRON MICROSCOPE,
by Alfred Baltz. Dec 63, 11p. Scientific rept. no. 3
Contract AF19 628 2415, Proj. 5635, Task 563503
AFCRL 64 43 Unclassified report

Descriptors: (*Electron microscopes, Positioning devices (Machinery)), Electron microscopy, Resolution, Electron beams, Diffraction.

AD-432 995 Div. 30, 29
OTS price $2.60

Army Quartermaster Research and Engineering Field Evaluation Agency, Fort Lee, Va.
STUDY OF A HUMIDITY SENSING METHOD FOR DETERMINING END POINTS IN TEXTILE DRYING OPERATIONS.
Rept. for Feb 63-Feb 64.
Feb 64, 23p.
USATECOM Proj. 7 3 0910 01E
Unclassified report

Descriptors: (*Textiles, Cleaning), (*Clothing, Clening), Hygrometers, Test methods, Test equipment, Humidity, Moisture.

AD-433 002 Div. 30, 8, 27
OTS price $6.60

Ohio State U. Research Foundation, Columbus.
NONDESTRUCTIVE SYSTEM FOR INSPECTION OF FIBER GLASS REINFORCED PLASTIC MISSILE CASES AND OTHER STRUCTURAL MATERIALS.
Quarterly status rept. no. 8, 29 Mar - 28 June 63,
by Jay P. Mitchell, Merle L. Rhoten and Robert C. McMaster. Aug 63, 61p.
Contract DA33 019ORD3670, Proj. 59332008
WAL TR142 5 2 7A
Unclassified report

Descriptors: (*Non-destructive testing, Rocket cases), (*Television display systems, Non-destructive testing), (*Rocket cases, Non-destructive testing), Image tubes, Radiography, Glass textiles, Filament wound construction, Welds, Selenium, Targets, Circuits, Video signals, Television cameras, Magnetic tape, Stainless steel.

Further work was carried out to improve performance and to extend the operational capabilities of television X-ray imaging systems. An audio-frequency tape recorder was utilized to record slow-scan television X-ray images on magnetic tape. A keyed clamping circuit was constructed and added to the recorder playback amplifier circuit. A larger-area television camera unit and associated circuit units were tested. This camera was fabricated to evaluate an experimental, 2-in. diam., X-ray-sensitive camera tube. A 1-in. diam., X-ray-sensitive camera tube having a 30-micron thick target was delivered. The se target material was doped with small quantities of as. Initial evaluation tests indicated that this tube had somewhat greater sensitivity than tubes having pure se targets, but the television image showed considerable deterioration when the specimen was moved through the X-ray beam. The television X-ray imaging system was used to determine the feasibility of monitoring a fusion welding process while the weld material was still molten. Imaging results indicated that porosity and crack propagation could be detected in 3/8 in. thick al alloy. (Author)

AD-433 003 Div. 30, 8, 14
OTS price $2.60

Ohio State U. Research Foundation, Columbus.
NONDESTRUCTIVE SYSTEM FOR INSPECTION OF FIBER GLASS REINFORCED PLASTIC MISSILE CASES.
Quarterly status rept. no. 4, June 61 - 1 July 62,
by Merle Rhoten, Jay P. Mitchell and Robert C. McMaster. Dec 63, 24p.
Contract DA33 019ORD3670, Proj. 5B93 32 004
WAL TR142 5 2 3
Unclassified report

Descriptors: (*Rocket cases, Non-destructive testing), (*Glass textiles, Non-destructive testing), (*Non-destructive testing, Glass textiles), (*Television display systems, Non-destructive testing), Filament wound construction, Radiography, Epoxy resins, Laminated glass, Image tubes, Selenium, Targets.

The report describes the use of a unique X-ray television imaging system for the inspection of fiber glass reinforced plastic materials. Contrast and resolution capabilities of the system are described and representative photographs of images are included. Discontinuities visualized by this inspection method have not been correlated with the mechanical properties of the material. The system offers great potential for the detailed inspection of fiber glass reinforced plastic materials. (Author)

AD-433 038 Div. 30, 5, 12, 8
OTS price $12.00

General Dynamics/Astronautics, San Diego, Calif.
RESEARCH DIRECTED TOWARD THE INVESTIGATION OF SUITABILITY OF THE GLOTRAC TYPE G TRANSPONDER FOR USE IN THE RANGE CALIBRATION SATELLITE. PART A.
Final engineering rept., pt. A,
by R. Braun. 1 Dec 63, 165p.
Contract AF19 628 3274, Proj. 5930, Task 593003
AFCRL 64 240, pt. A Unclassified report

Descriptors: (*Transponders, Communication satellites (Passive)), Design, Protective coverings, Seals (Stoppers), Metal coatings, Low pressure research, Heat transfer, Thermal conductivity, Electronic equipment, Space environmental conditions, Van Allen radiation belt, Radiation damage, Mathematical prediction.

The results are presented of a study program directed toward determining what modifications in the GLOTRAC Type G Transponder are required to make the transponder suitable for operation in the Range Calibration Satellite (RCS). Modifications are recommended in the transponder components and the transponder case in order to meet the more stringent RCS requirements, such as extended operational life, high vacuum, space radiation and an extended temperature range. (Author)

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-433 076 Div. 30, 8
OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MEASURING PULSATING PRESSURES WITH THE AID OF MEMBRANE TRANSDUCERS.
by Yu. G. Zakharov. 2 Jan 64, 21p.
FTD TT63 737 Unclassified report

Trans. from Tsentral'nyy Aero-gidrodinamikcheskiy Institut, Promyshlennaya Aerodinamika, Izmereniye Vozdushnykh Potokov, no. 19, pp. 9-20, 1960.

Descriptors: (*Transducers, Fluids), (*Pressure, Diaphragms (Mechanics)), (*Diaphragms (Mechanics)), Transducers, Frequency, Transients, Mathematical analysis, Performance (Engineering), Pressure gages.

AD-433 089 Div. 30
OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
MHD WIND TUNNEL PROGRAM.
Rept. for 1 Oct-31 Dec 63,
by D. A. Durran, W. R. Grabowsky and D. J. Spencer. 21 Feb 64, 23p. Rept. no. TDR269 4230 10 7
Contract AF04 695 269
SSD TDR64 11 Unclassified report

Descriptors: (*Hypersonic wind tunnels, Instrumentation), (*Magnetohydrodynamics, Hypersonic wind tunnels), Electric fields, Design, Configuration, Magnetic fields, Scheduling, Operation, Potassium, Cesium, Feasibility studies, Control systems, Gas discharges, Gas ionization, Particle acceleration techniques.

A pulsed-type experimental facility is being assembled to study the feasibility of a hypervelocity wind tunnel employing an MHD accelerator. This report presents a description of the hot shot that will be used as a source for the MHD accelerator. In addition, the present status of the experimental work concerned with the accelerator is given. (Author)

AD-433 111 Div. 30
OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
AN INTEGRATING AND A POLAR NEPHELOMETER FOR ATMOSPHERIC SCATTERING MEASUREMENTS IN THE ULTRAVIOLET,
by T. A. Jacobs and R. R. Giedt. 17 Feb 64, 19p.
Rept. no. TDR 269 4230 20 5
Contract AF04 695 269
SSD TDR64 12 Unclassified report

Descriptors: (*Atmosphere, Scattering), (*Light transmission, Measurement), Light pulses, Ultraviolet radiation, Meters, Flight testing, Integral equations, Intensity, Ultraviolet detectors, Ultraviolet filters, Photomultipliers.

Integrating and polar nephelometers have been constructed for the measurement of atmospheric scattering as a function of wavelength and altitude. The instruments were designed particularly for the 3000 to 3800 Angstrom spectral region. Preliminary results are presented of field measurements undertaken in the vicinity of Patrick Air Force Base, Florida, covering altitudes from sea level to 11,000 ft. (Author)

AD-433 144 Div. 30, 15
OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
THE PERCEPTRON CORRECTION PROCEDURE IN NON-SEPARABLE SITUATIONS,
by Bradley Efron. Feb 64, 19p.
Contract AF30 602 2943, Proj. 5581, Task 558104
RADC TDR63 533 Unclassified report

Descriptors: (*Teaching machines, Learning), (*Pattern recognition, Acuity), (*Brain, Bionics), Artificial intelligence, Mathematical intelligence, Mathematical analysis, Operation.

The behavior of the standard Perceptron correction procedure when the underlying patterns are non-separable is discussed. It is shown that in this case the magnitude of the succeeding weight vectors remains bounded. Moreover, if the magnitudes approach a limit this limit is actually attained, and the ensuing behavior is particularly simple. A converse to the usual Perceptron convergence theorem is presented. (Author)

AD-433 170 Div. 30
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DIGITAL VOLTMETER, VTS-2. (Vol'tmetr Tsifrovoy VTS-2),
4 Mar 64, 4p.
FTD TT64 5 Unclassified report

Trans. from Komitet Standartov, Mer i Izmeritel'nykh Priborov Pri Sovete Ministrov Soyuza SSR, p1, 1961.

Descriptors: (*Voltmeters, Digital systems), (*Digital systems, Voltmeters), Direct current, Automatic, Specifications, Performance (Engineering).

AD-433 186 Div. 30, 6, 16
OTS price $1.10

Foreign Tech. Div. Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A MINIATURE RADIOTELEMETRIC APPARATUS FOR RECORDING PHYSIOLOGICAL FUNCTIONS,
by L. P. Shuvatov. 26 Feb 64, 10p.
FTD TT63 1029 Unclassified report

Trans. from Elektronika V Meditsine, pp. 177-182, 1960.

Descriptors: (*Telemeter systems, Design), Physiology, Recording systems, Transmitter receivers, Miniature electrical equipment, Respiration, Temperature.

AD-433 201 Div. 30, 8
OTS price $1.60

ITT Communication Systems Inc., Paramus, N. J.
ANALYTICAL AND COMPUTER TECHNIQUES.
Progress rept.
31 Aug 63, 11p. Rept. no. 63TR251
Contract AF19 626 5
ESD TDR64 244 Unclassified report

Descriptors: (*Programming (Computers), Abstracts), (*Networks, Design), Queueing theory, Communication systems, Mathematical models, Data transmission systems, Control systems.

Either directly in the course of the work on computer technique or as a byproduct of contributory areas of investigation, several papers of interest over a wide field of development are presented in abstract form. (Author)

AD-433 212 Div. 30, 9
OTS price $2.25

Linde Co., Indianapolis, Ind.
DEVELOPMENT OF HIGH ENTHALPY, HIGH POWER ARC AIR HEATERS.

Rept. for 15 June 61-15 July 63,
by R. J. Sarlitto, R. C. Eschenbach, D. A. Bryson, R. N. Laakaniemi and H. H. Troue. Feb 64, 85p.
Contract AF33 616 8437, Proj. 1426, Task 142608
RTD TDR63 4055 Unclassified report

Descriptors: (*Hypersonic wind tunnels, Heating elements), Electric arcs, Plasma jets, Heaters, Gases, Dynamics, Thermodynamics, Aerodynamic characteristics, Electrodes, Injection, Polarization, High pressure research, Aerodynamic heating, Simulation, Test facilities, Test methods, Enthalpy, Design, Performance (Engineering), Measurement, Alternating current, Configuration, Anodes, Phase measurements, Cooling, Direct current.

The research program was directed toward increasing appreciably both the enthalpy attainable from air arc heaters at chamber pressures from 10 to 100 atmospheres and the power level at which satisfactory operation can be expected. Major achievements may be summarized as: (1) The enthalpy attainable at a given chamber pressure was more than doubled in comparison to the status at the beginning of the contract; enthalpies of about 10,000 Btu/lb at 90 to 100 atmospheres. (2) Applicability of the scaling laws previously determined was shown to be valid in the higher enthalpy operating area now attainable, although with less precision than found before. Design of a 50 MW heater, to operate over a range of pressures and enthalpies, was satisfactorily completed. (3) A 4MW high enthalpy heater, to be delivered to AFFDL, was operated at 7100 Btu/lb air enthalpy at 10 atmosphere chamber pressure at 1.8 MW with quite low erosion rate. (Author)

AD-433 220 Div. 30
OTS price $9.10

ITT Data and Information Systems Div.,
Paramus, N. J.
QUANTITATIVE METHODS OF INFORMATION PROCESSING SYSTEM EVALUATION,
by Paul W. Abrahams, Michael F. Lipp and Jacques Harlow. Oct 63, 105p. Rept. no. 5201TR0072
Contract AF19 628 2842, Proj. 2801, Task 280105
ESD TDR63 670 Unclassified report

Descriptors: (*Data processing systems, Information retrieval), Digital computers, Programming (Computers), Input-output devices, Programming languages, Scheduling, Design, Effectiveness, Analysis, Computer logic.

The objective of this study was to develop practical methods for specifying the characteristics of a data processing system and for comparing the performance of different systems. The methods cover both functional characteristics and engineering characteristics. The functional characteristics are specified in terms of macro operations that represent particular sample problems. Associated with these macro operations are parameters that serve to specify the macro operation completely. The selected macro operations cover commercial and scientific data processing. The engineering characteristics include factors such as configuration, word length, overlap, time for various operations, and logic. In a computer procurement, the purchaser specifies his requirements in terms of functional characteristics. The bidder selects a computer configuration and describes its performance in terms of either engineering characteristics or functional characteristics. The choice depends upon which of two different evaluation methods are used. Advantages and drawbacks of the methods are discussed. (Author)

AD-433 248 Div. 30, 9
OTS price $2.00

Space Sciences Lab., Litton Systems Inc.,
Beverly Hills, Calif.
DEVELOPMENT OF AN ALTERNATING CURRENT PLASMA ACCELERATOR FOR APPLICATION AS AN ULTRA HIGH VELOCITY WIND TUNNEL.
Rept. for 1 July 61-30 June 63,
by G. Fonda-Bonardi, A. Penfold, J. M. Rocard and D. Curtis. Dec 63, 71p.
Contract AF33 616 8458, Proj. 1426, Task 142603
ASD TDR63 834 Unclassified report

Descriptors: (*Plasma jets, Ion accelerators), (*Ion accelerators, Plasma jets), (*Atmosphere entry, Simulation), Alternating current, Gas ionization, Magnetic fields, Ferrites, Coils, Air, Argon, Nitrogen, Cooling & ventilating equipment, Wind tunnels, Hypersonic wind tunnels.

An electrodeless plasma accelerator is described for use in simulating re-entry environments. Principles of its operation and a technical description of its several parts are given. Descriptions are given of the gas injector, pre-ionizer, magnetic structure, and cooling devices. Only enough of the theory of the accelerator operation necessary to a general understanding of the machine is included. (Author)

AD-433 289 Div. 30
OTS price $1.10

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THEORY AND METHODS OF MATHEMATICAL SIMULATION,
by B. Ya Kogan and A. V. Shileiko. 3 Feb 64, 6p.
RSIC 125 Unclassified report

Trans. from Vestnik Akademii Nauk SSSR, no. 1, pp. 121-122, 1963.

Descriptors: (*Mathematical models, Simulation), Theory, Analog-digital computers, Integrators (Computers), Adaptive control systems, Digital differential analyzers.

31. SHIPS AND MARINE EQUIPMENT

AD-431 560 Div. 31, 25, 9
OTS price $3.60

David Taylor Model Basin, Washington, D. C.
A METHOD OF EVALUATING THE HYDRAULIC VIBRATION REDUCER BY AN ELECTRICAL ANALOG.
by D. F. Hayman, Jr. June 62, 40p.
Proj. S F013 01 03
DTMB 1616 Unclassified report

Descriptors: (*Vibration isolators, Hydraulic systems), (*Hydraulic systems, Vibration isolators), Analog systems, Mechanical properties, Propellers (Marine), Ship hulls, Analysis, Equations, Electrical networks, Mathematical analysis, Damping, Experimental data.

This report presents a method for evaluating the parameters of a hydraulic vibration reducer by an electrical mobility analog. A simplified hull representation, utilizing a complex impedance, is introduced for the analog. Curves are presented to demonstrate the effect of the vibration-reducer parameters on the change of hull response. The conversion of the hydraulic properties of the vibration reducer into an equivalent mechanical system is detailed in an appendix. (Author)

AD-431 916 Div. 31, 8, 30
OTS price $10.50

RCA Defense Electronic Products, Burlington, Mass.
A HYDROFOIL AUTOPILOT SYSTEM DESIGN STUDY PROGRAM.
Engineering summary rept.
Aug 63, 137p. Rept. no. CR 588 78 R
Contract NObs84498, Proj. SF0130201, Task 1709
Unclassified report

Descriptors: (*Hydrofoil boats, Control systems), (*Control systems, Hydrofoil boats), Servomechanisms, Feedback, Simulation, Automatic pilots, Water waves, Motion, Roll, Yaw, Specifications, Equations, Mathematical analysis, Performance (Engineering), Mathematical models, Wiring diagrams.

Contents: Extended analysis of the stability of a lateral control system for the 110-ton craft using roll angle and yaw rate feedback; Two-dimensional lateral simulation of the 110-ton craft; Three-dimensional simulation in regular and irregular seas; Application to other craft; Lateral system specifications for the 110-ton craft.

AD-432 010 Div. 31, 30
OTS price $4.60

Philadelphia Naval Shipyard, Pa.
COLLECTION OF LETTER REPORTS OF VIBRATION SURVEYS ISSUED DURING 1963.
by Robert Morrison. 1963, 44p.
Unclassified report

Descriptors: (*Ship hulls, Vibration), Ship noise, Maintenance, Acceptability, Tolerances (Mechanics), Diesel engines, Test equipment, Measurement.

AD-432 182 Div. 31, 9
OTS price $1.25

Stevens Inst. of Tech., Hoboken, N. J.
AN INVESTIGATION OF MIDSHIP BENDING MOMENTS EXPERIENCED IN EXTREME REGULAR WAVES BY MODELS OF A TANKER AND A DESTROYER.
Progress rept. no. 2,
by J. F. Dalzell. 3 Feb 64, 42p.
Contract NObs78211, Proj. SR157
SSC 156 Unclassified report

Report on Model in Extreme Waves.

Descriptors: (*Ship hulls, Stresses), Ship models, Tankers, Destroyers, Design, Ocean waves, Strain (Mechanics), Pitch (Motion), Model tests, Model basins, Hydrodynamics, Motion, Cargo ships.

This report summarizes experimental research to investigate the possibility of a physical upper limit on midship bending moments in tanker and destroyer type ships being reached in regular waves of height significantly less than the theoretical upper limit of stability for progressive waves (h/gamma = 1/7). Each model was tested at various speeds in regular head and following towing tank waves of several different lengths and of a wide range of heights. The results were compared with those obtained previously for a modern cargo vessel. No significant upper limit of bending moment was found. However, the study establishes more firmly the grossly linear dependence of midship bending moment on wave height, even for extreme wave heights which may be encountered in service. These findings strengthened the case for determining design wave bending moments on the basis of statistical analyses of ocean waves and/or resulting bending moments. (Author)

AD-432 262 Div. 31
OTS price $1.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
EVALUATION TESTS OF VOLUMETRIC LIQUID LEVEL INDICATING SYSTEM MANUFACTURED BY BARTON INSTRUMENT CORPORATION.
Evaluation test rept.,
by R. A. Hammaker, C. J. Foltz and J. W. Murdock.
24 Feb 64, 15p.
Proj. A403 3, Task 3950
Unclassified report

Descriptors: (*Tanks (Containers), Hulls (Marine)), (*Liquid level gages, Tanks (Containers)), Performance (Engineering).

A liquid level indicating system composed of a Barton differential indicator connected by capillary tubing to two liquid filled remote pressure sensing bellows was tested to ascertain the effect of various environmental parameters common to shipboard applications on the performance of the system. The results obtained were within acceptable limits for all parameters except ambient temperature. The susceptibility of the system to ambient temperature variations limits its use to constant temperature applications. (Author)

AD-432 278 Div. 31
OTS price $1.75

Stevens Inst. of Tech., Hoboken, N. J.
MODEL IN EXTREME WAVES. AN INVESTIGATION OF MIDSHIP BENDING MOMENTS EXPERIENCED IN EXTREME REGULAR WAVES BY MODELS OF THE MARINER TYPE SHIP AND THREE VARIANTS.
Progress rept. no. 1,
by J. F. Dalzell. 15 Jan 64. 60p.

Contract NObs78211, Proj. SR157
SSC 155 Unclassified report

Descriptors: (*Ship hulls, Moments), (*Stresses, Ship hulls), Ocean waves, Stability, Loading (Mechanics), Velocity, Tests, Statistical analysis, Ship models, Motion, Hydrodynamics.

This report summarizes experimental research to investigate the possibility of a physical upper limit on midship bending moments in the Mariner-type ship being reached in regular waves of height significantly less than the theoretical upper limit of stability for progressive waves. The experiments included variation of distribution of loading and of freeboard as model parameters. Each variation was tested at various speeds in regular head and following waves of several different lengths and of a wide range of heights. No significant upper limit of bending moment was found. However, the study establishes more firmly the grossly linear dependence of midship bending moment on wave height, even for extreme wave heights which may be encountered in service. These findings strengthened the case for determining design wave bending moments on the basis of statistical analyses of ocean waves and/or resulting bending moments. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-431 247 Div. 32
OTS price $2.60

RAND Corp., Santa Monica, Calif.
CREATIVITY AND RESEARCH IN THE UNIVERSITY,
by Richard Bellman. Jan 64, 21p. Rept. P2860
Unclassified report

Descriptors: (*Universities, Scientific research), (*Scientific research, Universities), Analysis, Sociology, Psychology, Students, Personnel, Theory, Human engineering, Psychiatry, Education.

AD-431 526 Div. 32
OTS price $1.60

RAND Corp., Santa Monica, Calif.
AFRICAN DISARMAMENT--A PROPOSAL SECONDED,
by Amrom H. Katz. Feb 64, 16p. Rept. no. P2868
Unclassified report

Descriptors: (*Disarmament, Foreign policy), Armed forces (Foreign), Armed forces (United States), Armaments, United nations.

AD-431 599 Div. 32
OTS price $1.60

California Inst. of Tech., Pasadena.
(No title).
Final rept.,
by Carl D. Anderson, H. Victor Neher, R. B. Leighton and E. W. Cowan. Jan 64, 11p.
Contract Nonr220 17
Unclassified report

Descriptors: (*Particles, Reviews), (*Energy, Military publications), History, Bibliographies, Scientific research, Cosmic rays, Solar radiation, Sun.

Research was concerned with: (1) A continuation of the study of high energy cosmic-ray reactions by means of cloud chambers. The purpose of this project is to work in the high energy range not yet possible with machines. (2) A study of the behavior of cosmic rays as a function of solar activity. This is a continuation of the balloon program started in 1951. (3) In 1957 activities under this contract were expanded to include work of Professor R. B. Leighton on the properties of the photosphere of the sun. (Author)

AD-431 686 Div. 32, 30
OTS price $6.60

Rand Corp., Santa Monica, Calif.
REPORT OF A SUMMER SEMINAR ON COMPUTATIONAL LINGUISTICS,
by David G. Hays. Feb 64, 62p. Memo no. RM3889
NSF
Grant GE1115
Unclassified report

Descriptors: (*Programming languages, Symposia), Theory, Operation, Training, Time.

A Seminar on Computational Linguistics, taught elementary programming, linguistic theory, mathematical linguistics, and existing programs for linguistic operations to twenty professors of linguistics. The report includes a detailed schedule, an analysis and evaluation of the Seminar by the participants, and a list of all persons involved. The evaluation indicates that most participants, while attempting to obtain further education in this area, will meantime begin using computers in their own research and that many of them will also teach this subject--some in special courses, some in general linguistics courses, and others only to research students. (Author)

AD-431 730 Div. 32
OTS price $7.60

RAND Corp., Santa Monica, Calif.
PUBLICATIONS OF THE SOCIAL SCIENCE DEPARTMENT, THE RAND CORPORATION, 1948-1964,
by Ian C. C. Graham and Bonnie S. Lieb. Mar 64, 79p. Memo no. RM3600 1
Unclassified report

Descriptors: (*Textbooks, Social science), (*Social science, Textbooks), Libraries, Political science, Communism.

AD-431 868 Div. 32, 30
OTS price $6.60

RAND Corp., Santa Monica, Calif.
REPORT OF A SUMMER SEMINAR ON COMPUTATIONAL LINGUISTICS,
by David G. Hays. Feb 64, 62p. Memo. no. RM3889
NSF
Grant GE1115
Unclassified report

Descriptors: (*Programming language, Symposia), Theory, Operation, Training, Time.

A Seminar on Computational Linguistics, taught elementary programming, linguistic theory, mathematical linguistics, and existing programs for linguistic operations to twenty professors of linguistics. The report includes a detailed schedule, an analysis and evaluation of the Seminar by the participants, and a list of all persons involved. The evaluation indicates that most participants, while attempting to obtain further education in this area, will meantime begin using computers in their own research and that many of them will also teach this subject - some in special courses, some in general linguistics courses, and others only to research students. (Author)

AD-431 874 Div. 32, 30, 23
OTS price $3.00

George Washington U., Washington, D. C.
A HANDBOOK FOR PROGRAMMERS OF AUTOMATED INSTRUCTION,
by William H. Melching, Robert G. Smith, Jr., Jesse C. Rupe and John A. Cox. Sep 63, 201p.
Unclassified report

Descriptors: (*Handbooks, Education), (*Education, Programming (Computers)), (*Programming (Computers), Handbooks), (*Teaching machines, Handbooks), Job analysis, Training, Learning, Test methods, Automation.

The purpose of this Handbook is to assist programmers and training supervisors as follows: It will serve as a textbook and guide for developing programmed training courses, it will keep new programmers from making elementary mistakes; it will be useful as a reference for the experienced programmer as an organized body of useful techniques; it will be useful as a guide for training supervisors in evaluating programmers. (Author)

AD-431 933 Div. 32
OTS price $4.60

Department of Labor, Washington, D. C.
MANPOWER AND AUTOMATION RESEARCH SPONSORED BY THE OFFICE OF MANPOWER, AUTOMATION AND TRAINING JULY 1, 1962 - JUNE 30, 1963.
Aug 63, 50p.
Unclassified report

Descriptors: (*Labor, Automation), (*Labor, Scientific research), (*Scientific research, Labor), (*Automation, Scientific research), Mobilization, Personnel management, Population, Industries, Information retrieval.

AD-431 950 Div. 32
OTS price $26.00

Smithsonian Institution, Washington, D. C.
AIR FORCE RESEARCH RESUMES, 1963. VOLUME 4.
1963, 586p.
Contract AF49 638 1213
OAR 016 Unclassified report

Descriptors: (*Abstracts, Air force research), (*Indexes, Air force research).

AD-432 036 Div. 32
OTS price $5.60

RAND Corp., Santa Monica, Calif.
AUTOMATIC PARSING AND FACT RETRIEVAL: A COMMENT ON GRAMMAR, PARAPHRASE, AND MEANING,
by Jane J. Robinson. Feb 64, 58p. Memo. no. RM4005PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Information retrieval, Programming language), (*Programming language, Information retrieval), Language, Coding, Input-output devices, Data processing systems, Automatic, Transformations.

A major problem is to provide for automatic recognition of sameness of meaning in spite of structural differences so that when a request for factual information is processed, any of the possible paraphrases of an answer will be retrieved from a natural language text. The RAND parsing grammar has been extended and refined so that identical labels are attached to comparable elements of structurally different paraphrases, such as the active-passive pair, 'X commands the third fleet' and 'The third fleet is commanded by X.' The sentences are first parsed automatically; then the output of the PARSE routine is fed into a subroutine called FLAG, which attaches labels that make the sameness of meaning explicit. The labels are attached by using coded information derived from the rules applied in the course of parsing the sentences. A sample of the output from the PARSE and FLAG routines shows how the differences in structure are resolved automatically and how the labels are attached that make possible the automatic retrieval of both sentences in response to a single relevant request. It is shown in detail how interrogative sentences also may be recognized as paraphrases of a single request and how the output from their processing can be used as input to a retrieval search. (Author)

AD-432 198 Div. 32
OTS price $19.75

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN EVALUATION OF LINKS AND ROLES USED IN INFORMATION RETRIEVAL,
by Jefferson D. Sinnett. Dec 63, 312p.
AFIT GE EE 63 24 Unclassified report

Descriptors: (*Information retrieval, Subject indexing), (*Subject indexing, Mathematical models), Classification, Effectiveness, Data processing systems, Digital computers.

The use of links and roles in an information retrieval system is evaluated. Links and roles are techniques for modifying a basic coordinate indexing method. The purpose of the modification is to reduce the amount of irrelevant information retrieved without losing relevant information. Theory of retrieval is reviewed, mathematical models are discussed, retrieval is described in terms of basic concepts for algebra of sets, and a method of scoring effectiveness is presented. Roles were found inferior to links. Links showed reduction of irrelevant information by over 56% while incurring less than five% loss of relevant information. (Author)

AD-432 215 Div. 32, 16
OTS price $12.50

406th Medical General Lab., Tokyo (Japan).
PROFESSIONAL REPORT JULY 1962 THROUGH JUNE 1963.
June 63, 173p.
Unclassified report

Descriptors: (*Reports, Medical research), (*Medical research, Reports), Bacteria, Chemistry, Insects, Animals, Medicine, Pathology, Blood, Veterinary medicine, Viruses, Rickettsia, Tables, Diagnosis, Diseases, Schistosoma, Ecology, Toxicity, Radio activity, Disease vectors, Fungis, Food, Water, Enterobacteriaceae, Parasites.

AD-432 231 Div. 32
OTS price $1.60

Engineers Joint Council, New York.
STUDY OF ENGINEERING TERMINOLOGY AND RELATIONSHIPS AMONG ENGINEERING TERMS.
Final rept., July 62-Aug 63,
by Eugene Wall. Aug 63, 20p.
Grant G24836
Unclassified report

Descriptors: (*Engineering, Vocabulary), (*Vocabulary, Engineering), Documentation, Subject indexing, Data processing systems, Data storage systems, Information retrieval, Analysis.

The objectives of this report were to determine the extent of common terminology, the degree of ambiguity of term meanings, and to evaluate the possibility of creating a unified vocabulary useful in the origination, storage, retrieval and dissemination of engineering information. The methods of achieving these objectives were to collect from the major engineering societies (plus Defense Documentation Center, Engineering Index, Engineering Societies Library and NASA) subject heading lists, thesauri, glossaries or term lists which they consider useful in indexing. Terms contributed by more than one organization were selected for most intensive consideration by ten subcommittees covering the major fields of engineering. During twenty-seven weeks of full-time effort the subcommittees selected terms adjudged of most utility within the engineering profession, resolved any serious ambiguities in term meaning, developed and recorded cross-references between terms, and provided scope notes and term definitions as needed. A total of about 10,500 terms were treated during this period. A 1000 term sample of the proposed vocabulary was analyzed from the results of the analysis. (Author)

AD-432 283 Div. 32, 14, 17
OTS price $1.25

Defense Metals Information Center, Columbus, Ohio
CLASSIFICATION OF DMIC REPORTS AND MEMORANDA BY MAJOR SUBJECT,
comp. by E. E. Fletcher. 15 Jan 64, 47p.
Rept. no. M185
Contract AF33 615 1121, Proj.
Unclassified report

Descriptors: (*Indexes, Materials), (*Materials, Indexes), Alloys, Metals, Ceramic materials, Composite materials, Glass textiles, Graphite, Intermetallic compounds, Reports, Tables.

To aid in quick identification and easy location of specific technical data and information in the various reports and memoranda which have been prepared and distributed by the Defense Metals Information Center, as well as by DMIC's forerunner, the Titanium Metallurgical Laboratory, a classification by major subject matter was prepared. The classification covers reports through DMIC Report 193 and memoranda through DMIC Memorandum 183. (Author)

AD-432 327 Div. 32
OTS price $1.10

RAND Corp., Santa Monica, Calif.
THE NATURE AND FUNCTION OF MILITARY R & D,
by B. H. Klein, W. H. Meckling and E. G. Mesthene.
4 Nov 60, 8p. Rept. no. P 2147
Unclassified report

Descriptors: (*Research program administration, Military requirements), (*Economics, Research program administration), Government procurement, Costs, Procurement, Production, Scheduling, Warfare, Industrial production.

AD-432 328 Div. 32
OTS price $2.60

RAND Corp., Santa Monica, Calif.
STANDARDS, STANDARDIZATION AND TEST EQUIPMENT,
by W. I. Rumer. 30 Nov 60, 27p. Rept. no. P2153
Unclassified report

Descriptors: (*Language, Standards), (*Vocabulary, Design), Standards, Errors, Standardization, Test equipment, Social communication.

The terms 'standards,' 'stamdardozatopm.' and 'test equipment' are often used in confusing and ambiguous ways. Their characteristics and implications are discussed. Illustrative examples are presented to establish perspective, understanding and a context for the use of these terms. The discussion of 'standards' considers their types, establishing authority, purpose, characteristics and cost. The section on 'standardization' examines effects it might have on design, production, logistics and training. 'Test equipment' is a supporting subsystem of the prime equipment; the discussion considers its functions, purposes, errors (due to tolerances and incomplete tests), and effect on the prime equipment. The intent is to gather together in one publication various aspects, especially the overall (not just dollar) cost, of standards and particularly standard items of test equipment. (Author)

AD-432 329 Div. 32
OTS price $4.60

RAND Corp., Santa Monica, Calif.
THE ROLE OF THE CHINESE IN LAO SOCIETY,
by J. M. Halpern. 15 Dec 60, rev. 1 Mar 61.
Rept. no. P2161
Unclassified report

Descriptors: (*Sociology, Urban areas), (*Economics, Sociology), Social communication, Commerce, History, Population, Political science, Military organizations, Tables.

AD-432 332 Div. 32
OTS price $2.60

RAND Corp., Santa Monica, Calif.
DIRECTIONS FOR FUTURE GROWTH OF THE SOVIET ECONOMY,
by J. A. Kershaw. 23 Jan 61, Rept. no. P2201
Unclassified report

Descriptors: (*Economics, Growth), Rural areas, Lzbor, Industries, Population, Wages, Commerce, History.

AD-432 333 Div. 32
OTS price $1.60

RAND Corp., Santa Monica, Calif.
SOME LINGUISTIC PROBLEMS OF RUSSIAN GRAPHIC ABBREVIATIONS,
by W. A. Stewart. 26 Jan 61, 15p. Rept. no. P2206
Unclassified report

Descriptors: (*Language, Theory), (*Scientific research, Language), Vocabulary, Computers, Machine translation, Design.

Written Russian tests on scientific or technical subjects almost always contain a quantity of special indeclinable forms known as abbreviations. Although abbreviations may reflect certain characteristics of the structure of the full-forms of which they are abridgements, and indeed may be described in terms of the distinctive and structural features which characterize the rest of the language, abbreviations pose certain additional problems in MT. Since some abbreviations represent strings of full-form occurrences there exists the possibility of dealing with them either as unit morphs or as phrases. Also, since the grammatical suffix which normally serves as a syntactical marker in Russian is usually dropped in forming abbreviations, the question of ascertaining the syntactical relationships of a given abbreviation with its environment must be solved by other means. (Author)

AD-432 353 Div. 32
OTS price $4.60

RAND Corp., Santa Monica, Calif.
THE SINO-SOVIET NUCLEAR DIALOGUE: 1963,
by Alice Langley Hsieh. Jan 64, 41p. Rept. no. P2852
Unclassified report

Descriptors: (*Social communication, Foreign policy, (*Social science, Nuclear warfare), (*Political science, Military organization), Nuclear weapons, Attitudes.

AD-432 354 Div. 32
OTS price $1.10

RAND Corp., Santa Monica, Calif.
GASP - A GENERAL ACTIVITY SIMULATION PROGRAM,
by Philip J. Kiviat and Alan Colker. Feb 64,
10p. Rept. no. P2864
Unclassified report

Descriptors: (*Language, Simulation), (*Language, Computers), Data processing systems, Design, Test methods, Industries, Models (Simulations), Input-output devices, Maintenance, Control, Transportation.

AD-432 426 Div. 32
OTS price $1.10

RAND Corp., Santa Monica, Calif.
A NOTE ON THE SOVIET MINIMUM WAGE,
by Janet G. Chapman. Mar 64, 10p. Rept. no. P2880
Unclassified report

Descriptors: (*Wages, Government employees), Money, Economics, Agriculture, Labor, Industries, Transportation, Construction, Communication systems, Commerce, Public health, Housing, Industrial production.

AD-432 480 Div. 32
OTS price $1.10

Weather Bureau, Washington, D. C.
THE GEOGRAPHY OF CHINESE WHEAT (Geografiia Kitaiskoi Pshenitsy),
by Iu. P. Laptev, tr. by Irene A. Donehoo.
Aug 63, 8p.
WB DC T100 Unclassified report

Trans from Priroda, Akademiia Nauk, USSR. No. 3, pp. 102-103, 1963.

Descriptors: (*Wheat, Geography), (*Geography, Wheat), Economics, Flour, Industries, Distribution, Analysis, Agriculture.

AD-432 518 Div. 32, 30
OTS price $1.60

Herner and Co., Washington, D. C.
DECIDING WHEN TO ESTABLISH YOUR OWN STORAGE AND RETRIEVAL SYSTEM,
by Saul Herner. 1963, 20p.
Contract AF49 638 1182
AFOSR 64 0230
Unclassified report

Descriptors: (*Documentation, Theory), (*Communication theory, Data processing systems), Scientific research, Industries, Reports, Classification, Selection, Information retrieval, Data storage systems, Chemistry.

AD-432 663 Div. 32
OTS price $1.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST COORDINATE INDEX PART II.
Rept. for 1 Oct 63-29 Feb 64.
10 Mar 64, 12p.
Unclassified report

Descriptors: (*Indexes, Reports), (*Subject indexing, Reports), (*Radiation effects, Bibliographies), Dosimeters, Electromagnetic waves, Environmental tests, Materials, Mechanical properties, Sources, Space flight.

AD-432 699 Div. 32
OTS price $3.60

RAND Corp., Santa Monica, Calif.
ANNOTATED BIBLIOGRAPHY OF RAND PUBLICATIONS IN COMPUTATIONAL LINGUISTICS,
by David G. Hays. Mar 64, 39p. Rept. no. RM3894PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Bibliographies, Machine translation), (*Machine translation, Bibliographies), Abstracts, Reading machines, Information retrieval, Programming languages, Computers, Language, Analysis, Compilers.

AD-432 789 Div. 32, 26
OTS price $18.00

Boston U., School of Public Relations and Communications, Mass.
OPINION RESEARCH AS A MANAGERIAL TOOL FOR INTERNAL PUBLIC RELATIONS: THE USAF SAMPLE SURVEY AND THE INTERNAL INFORMATION PROGRAM,
by Louis W. Cantelou, Jr. 1964, 282p.
Unclassified report

Master's thesis.

Descriptors: (*Public opinion, Management engineering), (*Public relations, Management engineering), Social science, Social communication, Air Force, Analysis, Attitudes, Tables, Control, Aviation personnel.

AD-432 870 Div. 32
OTS price $3.60

Naval Research Lab, Washington, D. C.
SUGGESTIONS AND PROCEDURES FOR TECHNICAL CONFERENCES,
by I. S. Rudin. Mar 56, 31p.
ONR SR ACR8 Unclassified report

Descriptors: (*Symposia, Design), Personnel, Control, Display systems, Effectiveness, Preparation.

AD-432 893 Div. 32
OTS price $4.60

Water Conservation Lab., Dept. of Agriculture, Tempe, Ariz.
ENERGY BALANCE STUDIES OVER SUDANGRASS, 1962.
Interim rept.,
by C. H. M. van Bavel and L. J. Fritschen.
Mar 64, 49p.
DA Task 1A0 11001B021 08
Unclassified report

Descriptors: (*Grasses, Growth), Agriculture, Energy, Evaporation, Heat transfer, Thermal radiation, Soils, Irrigation systems, Atmospheric temperature.

During 1962 the energy balance of a sudangrass crop was continuously studied from 5 June through 18 September in Tempe, Arizona. Hourly or half-hourly measurements were made of evaporative flux, net radiation, soil heat flux and sensible heat exchange--the latter by difference. The grass canopy was studied in a number of conditions; early emergence before and after irrigation, a complete green cover before and after irrigation, a cover that had developed seedheads, a freshly mown surface before and after irrigation, stages of recovery after mowing, and a full cover that had not received water for five weeks. Detailed energy balances are given for 16 periods of 24 hours, each of special interest. Daily balances are given for the entire period of observation except where unavoidable interruptions occurred. (Author)

AD-432 970 Div. 32
OTS price $12.00

George Washington U., Washington, D. C.
CAPACITY CONCEPTS AND MEASUREMENTS,
by Frank W. Segel, 18 Mar 64, 164p. Serial no. T169
Contracts Nonr76103, Nonr 76105, Projs. NR345 107, NR047 001
Unclassified report

Descriptors: (*Economics, Measurement), Industries, Growth, Test methods, Banking, Tables, Mathematical analysis, Logistics.

The essence of this paper is an examination of the properties of different capacity concepts and measurements and their use in investment models. The principal characteristic to be examined intensively is their usefulness in measuring the extent of capital utilization. In particular, the problem is to examine the behavior of the Evsey D. Domar exponential growth model for the manufacturing sector of the economy in the short run period from 1948 to 1959. Capacity definitions and concepts are discussed from the viewpoint of several empirical investigations and of different econometric techniques. The statistical portion of this paper pivots on two sets of fundamental calculations made from the basic data provided in Daniel B. Creamer's monograph, Capital Expansion and Capacity in Postwar Manufacturing. Assuming the methodology used by Creamer in his monograph provides valid measurements of the percentage of capacity utilized, the ability of the Domar growth model to provide similar measurements will be analyzed. This analysis will determine the nature of the conclusions of the paper with respect to the Domar hypothesis that given an equilibrium rate of growth which remains constant, the maintenance of full employment requires investment to grow at a constant compound interest rate. (Author)

AD-432 981 Div. 32, 28
OTS price $1.60

Amherst Coll., Mass.
THE EFFECTS OF SUCCESS AND FAILURE IN TOURNAMENT DEBATING,
by Robert C. Birney and Richard C. Teevan. 1964, 15p. Technical rept. no. 9
Contract Nonr3591 01, Proj. NR171 803
Unclassified report

Descriptors: (*Speech, Performance tests), Errors, Attitudes, Analysis of variance, Behavior, Scale, Motivation.

AD-433 001 Div. 32
OTS price $3.60

Indiana U., Bloomington.
INFORMATION STRUCTURES IN LINGUISTICS.
Final rept.,
by Thomas A. Sebeok. 31 Dec 63, 39p.
Grant AF AFOSR72 63
AFOSR 64 0396 Unclassified report

Descriptors: (*Language, Reports), (*Subject indexing, Theory), (*Language, Classification), Information retrieval, Classification, Libraries, Subject indexing, Coding, Errors, Personnel management, Vocabulary.

AD-433 026 Div. 32
OTS price $4.60

Water Conservation Lab., Dept. of Agriculture, Tempe, Ariz.
SURFACE ENERGY BALANCE IN ARID LANDS AGRICULTURE, 1960-61,
by C. H. M. van Bavel, L. J. Fritschen and R. J. Reginato. Dec 63, 50p.
Task 3A99 27 005 08
DOA W PRR76 Unclassified report

Descriptors: (*Soils), (*Agriculture, Terrain), (*Evaporation), Surface properties, Ecology, Experimental data, Test methods, Surface temperatures, Tables, Air, Water.

This report discusses methods and preliminary results of a study of the disposition of radiant energy over bare land that is wetted or ponded in an arid, hot climate. Evaporative flux at the surface is evaluated from a triplicate precision weighing lysimeter installation. Other methods are conventional: (1) comparison of small with large evaporating surfaces show relatively small advective effects at the surface; (2) over large, wet areas, daily balances show, as a rule, no net extraction of heat from the air; and (3) heat flow into the air is extremely variable during the day, depending on the nature of surface and wind conditions. More detailed analysis of the data are planned as well as continued studies involving surfaces with a vegetative cover. (Author)

AD-433 059 Div. 32
OTS price $1.60

Colorado U., Boulder.
METHODS FOR VALIDATION OF JUDGMENTS IN DECISION MAKING.
28 Jan 64, 11p.
Grant AF AFOSR62 278
AFOSR 64 0196 Unclassified report

Descriptors: (*Decision making (Psychology and psychometrics), Research program administration), Language (Social sciences), Behavior (Psychology and psychometrics), Symposia.

AD-433 274 Div. 32, 15
OTS price $1.60

RAND Corp., Santa Monica, Calif.
ECONOMIC SELECTION OF ALTERNATIVE RISK INVESTMENTS,
by J. M. English and R. H. Haase. Feb 63, 17p.
Rept. no. P2869
Unclassified report

In cooperation with California Univ., Los Angeles.

Descriptors: (*Economics, Banking), (*Banking, Economics), Probability, Test methods, Statistical data, Mathematical prediction, Management engineering, Engineering, Industries.

This study considers the selection of the best of a number of alternative investments for situations where the alternatives involve different cash flows. It proposes a method for comparing pairs of alternatives in terms of an acceptable minimal risk rate-of-return. The projection of future incomes and expenses is assumed to be approximated by, but not limited to, continuous functions. Values of future sums are discounted continuously. The criterion of choice introduces an expectation-variance principle such that the computed rate-of-return is established at some specified level of confidence. The technique provides a means of comparing alternatives in which the probabilities of the estimates differ for the several alternatives. The paper suggests that the method offers a better way to account for risk than the usual procedure of including it in the interest rate. (Author)

33. TRANSPORTATION

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AGRICULTURE

BNL-810(T-312)
Brookhaven National Lab., Upton, N. Y.
COBALT-60 BULK GRAIN IRRADIATOR. Study rept. 30 Jun 63, 73p Prepared in cooperation with Vitro Engineering Co.
Contracts AT(30-2)GEN-16 and S-1497
T-312
OTS $1.50

ASTRONOMY

N64-15783
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RELATIONSHIP BETWEEN THE SYSTEM OF ASTRONOMICAL CONSTANTS AND THE RADAR DETERMINATIONS OF THE ASTRONOMICAL UNIT
Duane O. Muhleman. 15 Jan 64, 24p
Contract NAS7-100
Technical rept. no. 32-477; NASA CR-53066
OTS $2.60

N64-15546
Rand Corp., Santa Monica, Calif.
STATISTICAL ANALYSIS OF ASTRONOMICAL UNIT ESTIMATES
Albert Madansky and Allan Marcus. Jan 64, 28p
Contract NASr-21(04)
Memo RM-3940-NASA; NASA CR-55541
OTS $2.60

Astrophysics

N64-14276
Boston Univ., Mass.
CATALOG OF LUNAR CRATERS III. Research rept. no. 8
Gerald S. Hawkins and Peter W. Mitchell. Nov 63, 26p
Grant NsG-246-62
NASA CR-55295
OTS $2.60

N64-15900
Boston Univ., Mass.
CATALOG OF LUNAR CRATERS IV. Research rept. no. 12
Gerald S. Hawkins, Peter W. Mitchell, and David D. Friesen. 12 Dec 63, 21p
Grant NsG-246-62
NASA CR-55536
OTS $2.60

N64-15538
Boston Univ., Mass.
CATALOG OF LUNAR CRATES V. Research rept. no. 13
Gerald S. Hawkins, Peter W. Mitchell. and David D. Friesen. Dec 63, 19p
Grant NsG-246-62
NASA CR-55547
OTS $1.60

N64-14231
Boston Univ., Mass.
REVISED CATALOG OF LUNAR CRATERS II. Research rept. no. 11
Gerald S. Hawkins and Peter W. Mitchell. Nov 63, 25p
Grant NsG-246-62
NASA CR-55297
OTS $2.60

N64-14282
Boston Univ., Mass.
REVISED CATALOG OF LUNAR CRATES I. Research rept. no. 10, Nov 63
Gerald S. Hawkins and Peter W. Mitchell. 1963, 25p
Grant NsG-246-62
NASA CR-55296
OTS $2.60

N64-14267
California Inst. of Tech., Pasadena.
SCIENTIFIC RESULTS OF THE MARINER II VOYAGE TO VENUS
Leverett Davis, Jr. 1963, 10p
Grant NsG-426
NASA CR-55369
OTS $1.10

Presented at the COPERS Summer School, Alpbach, Austria, 1 Aug 1963.

N64-14152
California Univ., La Jolla, Calif.
REMARKS CONCERNING THE CHEMICAL COMPOSITION OF THE ATMOSPHERE OF VENUS
Hans E. Suess. Oct 63, 12p
Grants NsG-322-63 and NsG-317-63
NASA CR-55367
OTS $1.60

N64-14179
Center for Radiophysics and Space Research, Cornell Univ., Ithaca, N. Y.
ON A POSSIBLE CLASS OF GALACTIC RADIO SOURCES
D. W. Sciama. 26 Aug 63, 29p
Grant NsG-382
CRSR no. 152; NASA CR-55340
OTS $2.60

N64-14287
Center for Radiophysics and Space Research, Cornell Univ., Ithaca, N. Y.
VISCOUS INTERACTION BETWEEN THE SOLAR WIND AND THE EARTH'S MAGNETOSPHERE
W. I. Axford. Sep 63, 29p
Grant NsG-382
CRSR-153; NASA CR-55341
OTS $2.60

N64-14285
Engineering Research Labs., Univ. of Arizona, Tucson.
DETECTION TECHNIQUES FOR TENUOUS PLANETARY ATMOSPHERES. Semiannual rept. no. 1, 1 Jun 63-1 Jan 64
Stuart A. Hoenig and Melvin M. Eisenstadt. [1964] 13p
Grant NsG-458
NASA CR-55379
OTS $1.60

N64-15891
General Mills Electronics Group, Minneapolis, Minn.
INVESTIGATION OF SPUTTERING EFFECTS ON THE MOON'S SURFACE. Quarterly status rept. no. 3, 25 Oct 63-24 Jan 64
G. K. Wehner, D. L. Rosenberg, and C. E. KenKnight. 12 Feb 64, 21p
Contract NASw-751
Rept. no. 2527; NASA CR-55720
OTS $2.60

PB-165 253
Geophysical Inst., Univ. of Alaska, College.
THE SPATIAL AND TEMPORAL VIBRATIONS IN HIGH ALTITUDE COSMIC NOISE ABSORPTION AND THEIR RELATION TO LUMINOUS AURORA.
Scientific rept. no. 4
Z. A. Ansari. May 63, 236p
Grants NSF-G14133 and NSF-GP947
Rept. no. UAG-R138
OTS $15.50

DESCRIPTORS: *Atmospherics, *Extraterrestrial radio waves, Radio waves, Absorption, *Aurorae, Oscillation, Magnetic storms, Measurement, Photometers, Antennas.

The relation between visual aurora and absorption of cosmic noise at 36 Mc/s is studied by several narrow beam antennas and photometers pointed in different directions along the magnetic meridian. The results of the study indicate that the so called auroral absorption can be divided into several distinguishable categories and sub categories. (Author)

N64-13286
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ASTRONAUTICS INFORMATION: CLASSIFICATION OF SPACES SUPPORTING GRAVITATIONAL FIELDS
A. Z. Petrov. 1 Oct 63, 29p
Contract NAS7-100
Astronautics information trans. no. 29; NASA CR-53026
OTS $2.60

Trans. from Kazan U. [Uchenye Zapiski:] 1954, v. 114 bk. 8 (Jubilee (1804-1954) Collection).

N64-15781
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ON THE PRESENCE OF OXYGEN IN THE ATMOSPHERE OF VENUS
V. K. Prokofev and N. N. Petrova. 15 Jan 64, 21p
Contract NAS7-100
Translation no. 33; NASA CR-53061
OTS $2.60

Trans. of [Akademiya Nauk SSSR]. Krymsk[aya] Astrofiz[icheskaya] Observ[atoriya]. Izv[estiya] 1963, v. 29, p. 3-14.

N64-13183
Southwest Center for Advanced Studies, Dallas, Tex.
SOLAR COSMIC RAY PROPAGATION CHARACTERISTICS
K. G. McCracken. [1963] 11p
Grant NsG-269-62
NASA CR-55150
OTS $1.60

For Presentation at the International Conference on Cosmic Rays, Jaipur, India.

N64-14841
Space Sciences Lab., Univ. of Calif., Berkeley.
ON OBSERVATIONS OF LUNAR MAGNETIC STORMS
A. Palm and S. Silver. 9 Jan 64, 5p
Grant NsG-243-62
Series no. 5, issue no. 3; NASA CR-55433
OTS $1.10

N64-15531
Space Technology Labs., Inc., Redondo Beach, Calif.
THEORETICAL STUDY OF THE COUPLING BETWEEN THE SOLAR WIND AND THE EXOSPHERE.
Quarterly status rept. no. 2, 14 Sep-11 Dec 63
F. L. Scarf. 11 Dec 63, 30p
Contract NASw-698
Rept. 8494-6002-SU-000; NASA CR-55683
OTS $2.60

BEHAVIORAL SCIENCES

PB-165 231
[Research Analysis Corp., McLean, Va.]
HUMAN FACTORS IN MILITARY OPERATIONS. SOME APPLICATIONS OF THE SOCIAL SCIENCES TO OPERATIONS RESEARCH. Technical memo on Project SHOP
Richard Hays Williams. 7 Jan 54, 409p
[Contract DA44-109-qm-266]
ORO-T-259; AD-124 849
OTS $22.25

DESCRIPTORS: *Armed forces operations, *Operations research, *Group dynamics, *Training, *Human engineering, Warfare, Emotions, Decision making, Attitudes.

Contents: The theory of action in operations research and in social sciences; some crucial problems in manpower; community organization; American culture, national character, and problems of mobilization; mass communications, public information, and changing attitudes; the problem of training; skilled behavior under conditions of stress; communications and readibility; training aids and devices; special training devices; small arms training; interchangeability and standardization of weapons, material, and design: a human engineering evaluation; fatigue; optimum age for military service; fear; panic; military life and mental health; the military group; the military hierarchy and "caste" divisions; and problems in the utilization of troops in foreign areas.

PB-165 235
[Research Analysis Corp., McLean, Va.]
THE KANSAS CITY FLOOD AND FIRE OF 1951. Technical memo. on Project ATTACK. 25 Aug 52, 43p
[Contract DA44-109-qm-266]
ORO-T-203; AD-4617
OTS $4.60

DESCRIPTORS: *Disasters, *Floods, *Fires, Warning systems, *Missouri, Urban areas, *Attitudes, *Reaction (Psychology), Military personnel, Radiological warfare.

As part of a larger survey of all types of disaster, the Kansas City flood and fire of 1951 was investigated. This disaster was typical of that in which there is a long warning period before the catastrophe. The behavior of civilians, and of such trained disaster fighters as firemen, before and during the unprecedented event was analyzed to determine whether behavior patterns exist which might apply to troop behavior under atomic attack. Among the conclusions: (1) in a long-threatened disaster, continued warnings may minimize the sense of threat; (2) soldiers should be taught what to expect from an atomic bomb, and what defense or follow-up measures to institute; (3) since the initial impact will cause temporary disorganization, an immediate follow-up by the attacker will increase the effect of a bomb; (4) esprit de corps and loyalty to commanding officer will enable individuals to withstand unusual stresses. (Author)

PB-165 218
[Research Analysis Corp., McLean, Va.]
A STUDY OF THE EFFECT OF CATASTROPHE ON SOCIAL DISORGANIZATION. Technical memo. on Project ATTACK
Leonard Logan, Lewis M. Killian, and Wyatt Marrs. 23 Dec 51, 141p
[Contract DA44-109-qm-266]
ORO-T-194; AD-368
OTS $11.00

DESCRIPTORS: *Disasters, *Group dynamics, Behavior, *Survival, Fires, Military personnel, Nuclear explosions.

An investigation was made of the reactions of troops to atomic attack by extrapolation from the observed behavior of civilian groups in disasters and troops in conventional warfare. (Author)

AD-403 304
Research Analysis Corp. [McLean, Va.]
SUMMER PROGRAM IN OPERATIONS RESEARCH FOR HIGH SCHOOL STUDENTS, 1956-1962. Technical paper
Jean G. Taylor. Mar 63, 30p
Contract DA44-188-ARO-1
RAC-TP-87
OTS $2.60

DESCRIPTORS: *Operations research, *Education, Training, Students, Scientific personnel.

In 1956 a summer research program for high school students was initiated at the Operations Research Office (ORO). This program continued for seven summers through 1962, in which year it was under the Research Analysis Corporation (RAC), the successor organization to ORO. During the 7-year period 97 sophomores juniors, and seniors from local high schools have participated in the program. The tangible payoff of the program for ORO-RAC has been high. Their research efforts have resulted in 14 published and distributed regular ORO-RAC documents. In addition students have been employed by the organization in summers subsequent to their participation in the program, and have authored or coauthored nine publications. An evaluation from the students' point of view is difficult; however, their reply to a survey indicates that participation in the program has had beneficial effects on their college, graduate school, and work career. (Author)

PB-165 236
[Research Analysis Corp., McLean, Va.]
TROOP REACTIONS TO ATOMIC ATTACK. A PREVIEW. Technical memo. on Project ATTACK
Leonard Logan and Lewis M. Killian. 25 July 52, 67p
[Contract DA44-109-qm-266]
ORO-T-205; JHU-ORO-T-205; AD-3126
OTS $6.60

DESCRIPTORS: *Radiological warfare, *Nuclear explosions, *Military personnel, *Attitudes, *Reaction (Psychology), *Disasters.

By studying human behavior in non-atomic disasters such as fires, floods, tornadoes, etc., and extrapolating typical patterns of behavior to a hypothetical A-bomb attack, certain predictions on troop reactions to the weapon were made. Normal military organization will minimize unregulated individual actions, and will supply competent leadership. Training should stress individual protection, reorientation, and the importance of resisting follow-up attacks. During offensive use of the A-bomb, immediate infiltration, isolation of defending units, interdictory fire to block movements of reserves, and preliminary psywarfare can maximize the effects of its tactical usage. (Author)

NAS-NRC-1095.
Disaster Research Group, NAS-NRC, Washington, D. C.
BEFORE THE WIND. A STUDY OF THE RESPONSE TO HURRICANE CARLA
Harry Estill Moore, Frederick L. Bates, Marvin V. Layman, and Vernon J. Parenton. 1963, 180p
Contracts OEP-SR-62-23 and OEP-SR-62-25
Disaster Study no. 19
NAS-NRC $2.00

DESCRIPTORS: *Group dynamics, *Reaction (Psychology), Sociology, Stress (Psychology), *Disasters, *Tropical cyclones,

Hurricane Carla, offered a unique opportunity for studying mass evacuation. Carla was of such magnitude and behaved in such a fashion as to create acute danger of impending disaster over an area extending from Grand Isle, Louisiana, to Corpus Christi, Texas. This report presents the results of a study of that mass evacuation and the events preceding and following it. This study of the reactions to Hurricane Carla, on the part of persons, institutions, and communities in the threatened area, naturally falls into two parts. These are (1) the threat posed by the approaching storm as perceived by the persons concerned, and (2) the actions taken by these persons on the basis of their perceptions. (Author)

PB-163 548
Northwestern Univ., Evanston, Ill.
APPRAISAL OF PSYCHOMOTOR PERFORMANCE IN MAN AND DOG. Rept. no. 6(Final, 15 Jan 60-14 Jul 61
Jerome Cohen and Jack Arbit. [1961] 101p
Contract DA19-129-qm-1539
QMFCIAF File no. N-1134
OTS $9.10

DESCRIPTORS: *Psychomotor tests, *Perception, Motivation, Psychometrics, Reaction (Psychology), Stress (Psychology), Man, Dogs.

Topics include: stimulus generalization in man and in dogs; intensity discrimination in dogs (visual and auditory); intensity discrimination in dogs under extreme stress conditions; the effect of extreme stress conditions upon bar pressing to a light; compound stimulus generalization in dogs; and the effect of pre-feeding half rations upon stimulus generalization in dogs.

PB-165 229
[Research Analysis Corp., McLean, Va.]
CHINA: AN AREA MANUAL. VOLUME I. GEOGRAPHICAL, HISTORICAL, AND MILITARY BACKGROUND. Technical memo. on Project POWOW
David Nelson Rowe and Willmoore Kendall, eds.
24 Apr 53, 266p
[Contract DA44-109-qm-266]
ORO-T-229; AD-35 389
OTS $17.00

DESCRIPTORS: *China, *Geography, *History, Political science, *Military intelligence, Handbooks, *Psychological warfare.

This is the first of three volumes of an area manual on China prepared by a group of scholars familiar with the Chinese language, geography, history, and culture. It is intended to serve as a compendium of general information for use by military personnel. Volume 1 deals with Chinese geography, provinces, history, military affairs, and Communist leaders. (Author)

PB-165 233
[Research Analysis Corp., McLean Va.]
THE GROUP VS THE INDIVIDUAL IN RESEARCH. Technical paper
Helen S. Milton and Henrietta H. Green. July 60, 17p
[Contract DA44-109-qm-266]
ORO-TP-4
OTS $1.60

DESCRIPTORS: *Scientific research, *Research program administration, Group dynamics, Reports, Leadership.

As part of a larger survey ORO has made a count of the number of authors per article of ten scientific journals from 1920 to the present. The results emphasize the rising percentage of collaborating authors over this period, which, in turn, reflects the increase in group research. The advantages and dangers of group research are discussed in the light of creativity, production, and leadership. The authors conclude that modern scientific methods demand a shift from the lone-wolf scientist to the research group, and that the chief perquisite for productive functioning of the group is good management. (Author)

PB-165 237
[Research Analysis Corp., McLean Va.]
THE NATURE OF PSYCHOLOGICAL WARFARE. Technical memo. on Project POWOW
Wilbur Schramm. 5 Jan 53, 289p
[Contract DA44-109-qm-266]
ORO-T-214; AD-22 478
OTS $18.00

DESCRIPTORS: *Psychological warfare, *Propaganda, Perception, Attitudes, Instruction manuals.

A general introductory text on the principles and practice of psychological warfare.

PB-165 232
[Research Analysis Corp., McLean, Va.]
TARGET ANALYSIS AND MEDIA IN PROPAGANDA TO AUDIENCES ABROAD. Technical memo. on Study POWOW
Alfred de Grazia. 27 Feb 53, 232p
[Contract DA44-109-qm-266]
ORO-T-222; AD-22 617
OTS $15.50

DESCRIPTORS: *Psychological warfare, *Propoganda, Newspapers, Periodicals, Motion pictures, Radio communication systems, Loudspeakers.

The means of communication between the sender of a propaganda message and his target audience are the principal subjects of the book. A discussion is given of the principles governing the use of all significant psychological warfare media. (Author)

LA-3026
Los Alamos Scientific Lab., N. Mex.
BODPRO: AN ULTRACENTRIFUGAL BOUNDARY DIAGNOSTIC COMPUTER PROGRAM
P. N. Dean, G. R. Shepherd, and B. J. Noland. Nov 63, 33p
Contract W7405-eng-36
OTS $0.75

N64-14180
Rand Corp., Santa Monica, Calif.
MAN'S THERMAL BALANCE IN SPACE ENVIRONMENTS
Herman P. Roth. Oct 63, 16p
Contract NASr-21(08)
Rept. P-2810; NASA CR-55279
OTS $1.60

Presented at the SAE National Aeronautics and Space Engineering Meeting, Los Angeles, 23-27 Sep 1963.

ORO-614
UT-AEC Agricultural Research Lab., Univ. of Tennessee, Oak Ridge.
SEMI-ANNUAL PROGRESS REPORT, JANUARY 1-JUNE 30, 1963. Jan 64, 120p
Contract AT(40-1)GEN-242
OTS $2.50

N64-15895
Union Carbide Research Inst., Tarrytown, N. Y.
THE GENERAL AND COMPARATIVE BIOLOGY OF TERRESTRIAL ORGANISMS UNDER EXPERIMENTAL STRESS CONDITIONS.
Quarterly rept. no. 2
S. M. Siegel. 31 Dec 63, 38p
Contract NASw-767
NASA CR-52635
OTS $3.60

Anatomy and Physiology

PB-165 249
Aerospace Medical Lab., [Aeronautical Systems Div.] Wright-Patterson AFB, Ohio.
POTENTIAL USES OF ALTERNATE BINOCULAR PRESENTATION IN STUDIES OF VISION AND AS AN INDICATOR OF PHYSIOLOGICAL STRESS. Rept. on Psychological Research on Human Performance
Aaron Hyman. Mar 60, 18p
WADD Technical rept. 60-302; AD-245 184
OTS $1.60

DESCRIPTORS: *Space perception, *Stress (Physiology), *Vision, Adaptation (Physiology) Obstruction (Physiology), Stimulation, Aviation personnel.

Two phenomena are studied: stereofusion resulting from alternate stimulation of the two eyes with disparate displays, and response latency of eye movements resulting from periodic ocular occlusion. The usefulness of such investigations, particularly for the development of simple indices reflecting the presence of physiological stress, is discussed. Indicators of physiological stress are needed for evaluating protective devices and procedures which are to be used by personnel flying in future high-performance aircraft and spacecraft. Also discussed is the contribution which may be provided to vision theory by an investigation of the phenomenon of stereofusion from alternate binocular presentation. At some frequencies and with some temporal patterns of alternate presentation, an observer, shown binocularly disparate views of a target, saw two stationary targets laterally displaced instead of a single stationary target displaced in depth; yet, the disparate retinal points stimulated by the target were capable of creating a fused impression when the presentation to the two eyes was simultaneous, or at a higher frequency of alternation. (Author)

N64-16324
Brain Research Inst., Univ. of California, Los Angeles.
CORTICAL-SUBCORTICAL RELATIONSHIPS OF THE CHIMPANZEE DURING DIFFERENT PHASES OF SLEEP
J. M. Rhodes, M. R. Reite, Dan Brown, and W. R. Adey. [1963], 23p
Grants NsG-203-62, NsG-502, and AF AFOSR 246-63
NASA CR-55689
OTS $2.60

PB-165 246
Harvard School of Public Health, Boston, Mass.
PERFORMANCE OF A "DESERT GROUP" VERSUS A "TEMPERATE GROUP" OF YOUNG MEN IN THE DESERT OF YUMA. Annual rept. for 1 Mar-57-28 Feb 58, on Habitability Studies in Climate Extremes
Constantin P. Yaglou and Anne Messer. 28 Feb 58, 17p
Contract DA49-007-MD-203
AD-158 521
OTS $1.60

DESCRIPTORS: *Acclimatization, *Exercise, Deserts, Heat, Military personnel, Stress (Physiology), Tolerances (Physiology).

A comparison of the performance of paid civilian subjects who were natives or established residents of a hot-dry summer climate, with that of a group of young soldiers imported to the desert of Yuma from cooler regions, showed that the former group ("desert group") was capable of walking in extreme heat about twice as long as the "temperate group" with a lower metabolic energy expenditure, a lower rectal temperature, and a lower sweat rate and heart rate. Tolerance limits for heat were higher and the incidence of disabling heat symptoms was lower in the desert group than in the temperate group after a two-week period of physical conditioning. Despite the longer working hours, the desert subjects maintained their initial body weight, while all subjects of the temperate group lost weight during the study period. The superior performance of the desert group is ascribed not so much to their high motivation and morale, but largely to their highly efficient heat regulating system and their "know-how" of living and working in a hot climate. (Author) (See also PB 165 245)

PB-165 247
Harvard School of Public Health, Boston, Mass.
PERFORMANCE OF YOUNG FLORIDIANS IN THE HUMID HEAT OF SOUTHERN FLORIDA. Annual rept. for 1 Mar 58-28 Feb 59, on Habitability in Climate Extremes
Constantin P. Yaglou, Nathaniel Glickman, and Anne Messer. 28 Feb 59, 20p
Contract DA49-007-MD-203
AD-213 619
OTS $1.60

DESCRIPTORS: *Acclimatization, *Humidity, *Exercise, Heat, Florida, Military personnel, Stress (Physiology).

The maximum heat stress on Floridian subjects walking in the tropical sunshine at 3 or 3-1/2 mph, in July and August 1958, was only about one-half of that encountered in the desert of Yuma by a similar group of Arizonians performing identical exercises in July and August 1955 and 1956. Under conditions of comparable climatic and metabolic heat stresses, the Floridians sweated distinctly less than did their counterparts in Yuma, but suffered a greater rise of body temperature and heart rate. Loss of body weight over the study period was also greater in the former than in the latter group despite the lower heat stress in Florida than in Yuma. Work rest schedules found efficient in the desert of Yuma had little effect on performance in Florida. Danger of heat exhaustion to Floridians was limited only to the first two days of exercises. There were no heat casualties, no heat rash, and no "sweat-gland fatigue" during the study period. (Author) (See also PB 165 246)

PB-165 245
Harvard School of Public Health, Boston, Mass.
WORK-REST SCHEDULES FOR DESERT HEAT. Annual rept. for 1 Mar 56-28 Feb 57, on Habitability in Climatic Extremes
Constantin P. Yaglou and Anne Messer. 28 Feb 57, 17p
Contract DA49-007-MD-203
AD-135 169
OTS $1.60

DESCRIPTORS: *Exercise, *Heat, *Acclimatization, Stress (Physiology), Perspiration, Body temperature, Deserts.

Marches of 25 to 50 minutes duration in the sun at 3-1/2 mph, when alternated with rest pauses of 5 to 10 minutes in the shade, for 6 hrs. a day, produced no serious heat distress in 4 seasoned subjects, even in the hottest desert weather encountered at the Yuma Test Station in the summer of 1956 (max. wet bulb-globe temperature 90°F). For the same daily mileage (18 mpd), marches of 75 to 150 minutes interspersed with rest pauses of 15 to 30 minutes, sometimes produced incipient heat exhaustion symptoms in 1 or 2 of the 4 subjects at wet bulb-globe temperatures as low as 88°. Heart Rates and rectal temperatures were higher during the long work-rest schedules than during the short ones, and the heart rate recovery time was abnormally long in subjects affected by prolonged work in the heat, resulting in a loss of time and work output. Barring emergencies, there seems to be no justification for long work-rest schedules in desert heat, when shorter schedules offer distinct advantages in performance and safety. (Author)

PB-163 543
Laboratory of Physiological Hygiene, Univ. of Minnesota, Minneapolis.
NUTRITION AND PERFORMANCE CAPACITY. Rept. no. 13 (Final), 1 Jun 53-31 May 58
Ancel Keys, H. L. Taylor, and J. Brozek. [1958] 119p
Contract DA44-109-qm-1526
QMFCIAF File no. N-1125; AD-231 624
OTS $9.60

DESCRIPTORS: *Nutrition, Survival, *Stress (Physiology), Military personnel, Nitrogen, Proteins, *Physical fitness, Dehydration, Starvation, Water, *Military rations.

This report presents the general framework within which the studies were carried out; the sequence of events; highlights of the investigations of the effects on human organism of calorie restriction, water restriction and rapid (acute) dehydration; comments on the interpretation of laboratory tests of fitness and on nitrogen loss and fitness; recommendations regarding survival rations and further research; and the bibliography of publications. (Author)

N64-16331
Naval School of Aviation Medicine, Pensacola, Fla.
A BRIEF VESTIBULAR DISORIENTATION TEST
Charles S. Harris, Rosalie K. Ambler, and Fred E. Guedry, Jr. 1 May 63, 13p
Proj. MR005.13-6001, R-82; NASA Order R-47
NASA CR-55784
OTS $1.60

N64-15347
Naval School of Aviation Medicine, Pensacola, Fla.
A COMPARISON OF THE SYMPTOMATOLOGY EXPERIENCED BY HEALTHY PERSONS AND SUBJECTS WITH LOSS OF LABYRINTHINE FUNCTION WHEN EXPOSED TO UNUSUAL PATTERNS OF CENTRIPETAL FORCE IN A COUNTER-ROTATING ROOM
Ashton Graybiel and Walter H. Johnson. 22 Jun 62, 18p
NASA Order R-47
Proj. MR005.13-6001, R-70; NASA CR-55621
OTS $1.60

N64-15540
Naval School of Aviation Medicine, Pensacola, Fla.
FREQUENCY RESPONSE OF THE HUMAN SEMI-CIRCULAR CANALS. II. NYSTAGMUS PHASE SHIFT AS A MEASURE OF NONLINEARITIES
W. Carroll Hixson and Jorma I. Niven. 26 Jul 62, 20p
NASA Order R-37
Proj. MR005.13-6001, R-73; NASA CR-55624
OTS $1.60

N64-15349
Naval School of Aviation Medicine, Pensacola, Fla.
HUMAN PERFORMANCE DURING TWO WEEKS IN A ROOM ROTATING AT THREE RPM
Fred E. Guedry, Jr., Robert S. Kennedy, Charles S. Harris, and Ashton Graybiel. 28 Aug 62, 29p
NASA Order R-47
Proj. MR005.13-6001, R-74; NASA CR-55622
OTS $2.60

N64-15355
Naval School of Aviation Medicine, Pensacola, Fla.
PERCEPTION OF THE POSTURAL VERTICAL FOLLOWING PROLONGED BODILY TILT IN NORMALS AND SUBJECTS WITH VESTIBULAR DEFECTS
Brant Clark and Ashton Graybiel. 10 Apr 63, 9p
NASA Order R-37
Proj. MR005.13-6001, R-81; NASA CR-55614
OTS $1.10

N64-15350
Naval School of Aviation Medicine, Pensacola, Fla.
POSITIONAL ALCOHOL NYSTAGMUS IN RELATION TO LABYRINTHINE FUNCTION
Charles S. Harris, Frederick E. Guedry, and Ashton Graybiel. 3 Dec 63, 22p
NASA Order R-47
Proj. MR005.13-6001, R-76; NASA CR-55619
OTS $2.60

N64-15354
Naval School of Aviation Medicine, Pensacola, Fla.
ROLE OF THE OTOLITH ORGANS IN THE PERCEPTION OF HORIZONTALITY
Earl F. Miller, III and Ashton Graybiel. 19 Mar 63, 22p
NASA Order R-37
Proj. MR005.13-6001, R-80; NASA CR-55616
OTS $2.60

N64-15351
Naval School of Aviation Medicine, Pensacola, Fla.
ROTARY AUTOKINESIS AND DISPLACEMENT OF THE VISUAL HORIZONTAL ASSOCIATED WITH HEAD (BODY) POSITION
Earl F. Miller, II and Ashton Graybiel. 5 Mar 63, 13p
NASA Order R-47
Proj. MR005.13-6001, R-77; NASA CR-55618
OTS $1.60

N64-15348
Naval School of Aviation Medicine, Pensacola, Fla.
THE VALIDITY OF TESTS OF CANAL SICKNESS IN PREDICTING SUSCEPTIBILITY TO AIRSICKNESS AND SEASICKNESS
Robert S. Kennedy and Ashton Graybiel. 27 Jun 62, 11p
NASA Order R-47
Proj. MR005.13-6001, R-71; NASA CR-55620
OTS $1.60

N64-14898
Nelda Childers Stark Lab. for Human Nutrition Research, Texas Woman's Univ., Denton.
FUNDAMENTAL INVESTIGATION OF LOSSES OF SKELETAL MINERAL IN YOUNG ADULT HUMAN MALES AND COLLATERALLY IN YOUNG ADULT MALE PIGTAIL MONKEYS (MACACUS NEMESTRIMA) THROUGH IMMOBILIZATION FOR VARYING PERIODS OF TIME, COUPLED WITH A STUDY OF METHODS OF PREVENTING OR REDUCING MINERAL LOSS.
Semiannual rept. 1 Apr-30 Sep 63
Pauline Beery Mack, Ralph E. Pyke, George P. Vose, Andrew C. Pronay, and Walter W. Gilchrist. 30 Sep 63, 50p
Grant NsG-440
NASA CR-55313
OTS $4.60

PB-163 547
Bjorksten Research Labs., Inc., Madison, Wis.
STUDY OF SECONDARY DETERIORATION IN PARTIALLY OXIDIZED LIPIDS. Rept. no. 7(Final), 15 Jan 60-14 Oct 61
Fred A. Andrews and Bruce Trenk. [1961] 19p
Contract DA19-129-qm-1549
QMFCIAF File no. L-400
OTS $1.60

DESCRIPTORS: *Lipids, Oxidation, *Proteins, Amino acids, Rancidity, Degradation, Methyl linoleate.

Using a model system approach it was established that pure proteins are chemically modified when held in the presence of autoxidizing methyl linoleate. The data indicate that aldehyde intermediates react with the ϵ-amino group of lysine, and also with the N-terminal amino groups of proteins. (Author)

PB-163 567
Columbia Univ., New York
EFFECT OF IONIZATION RADIATION ON THE DEVELOPMENT OF OFF-ODORS AND FLAVORS IN PROTEINS. Rept. no. 4(Final), 1 Jul 55-31 Dec 56
R. R. Becker and D. M. Kirschenbaum. [1957] 27p
Contract DA19-129-qm-441
QMFCIAF File no. S-524; AD-161 783
OTS $2.60

DESCRIPTORS: *Proteins, *Amino acids, *Radiation effects, *Phenylalanine, *Tyrosine, Phenols, Radiation chemistry, Chromatographic analysis, *Taste, *Odors.

Three compounds were identified by chromatographic techniques as products of the irradiation of L-phenylalanine in aqueous solution. The three compounds are tyrosine, and ortho- and metahydroxy-phenylalanine. These products were identified when phenylalanine was irradiated in either neutral or basic solution. When acidic solutions were irradiated, these compounds were not detected. Irradiation of methionine solutions yielded methionine sulfoxide along with several other unknown ninhydrin- and hexaiodoplatinate-positive spots. Methionine sulfone was tentatively identified as one of the irradiation products. Irradiation of tryptophan either in aerated or deaerated solutions led to 5-hydroxy-tryptophan, and several other indole-containing compounds which were not identified. Irradiation of aqueous suspensions of poly-phenylalanine led to phenolic products which were not identified. (Author)

NAS-NRC-1145
Committee on Photobiology, NAS-NRC, Washington, D. C.
PHOTOSYNTHETIC MECHANISMS OF GREEN PLANTS. PAPERS PRESENTED AT A SYMPOSIUM HELD AT ARLIE HOUSE, WARRENTON, VIRGINIA, OCTOBER 14-18, 1963
Bessel Kok and André Jagendorf. 1963, 777p
NAS-NRC $12.00

DESCRIPTORS: *Plants (Botany), *Photosynthesis, *Chlorophylls, Oxidation-reduction reactions, Electrons, Gases, Respiration, Organic pigments, Hydrogen, Carbon, Metabolism, Molecular structure, Phosphorylation.

Contents:
Topics include: Spectroscopic and fluorescence analysis of oxidation-reduction catalysts; electron transport paths (biochemical investigations); studies with isolated electron carriers; enhancement studies (gas exchanges); respiration, photosynthesis, and hydrogen metabolism; function of pigments and pigment complexes; chloroplast structure and oriented molecules; mechanism of phosphorylation, and structural deformations; path of carbon and associated metabolism.

TID-19259
Kansas State Univ., Manhattan
LABELING CARBOHYDRATES BY EXPOSURE TO ENERGETIC TRITIUM ATOMS
H. C. Moser, Philip Nordin, and J. K. Senne. [1963] 7p
Contract AT(11-1)584 and Grant NSF G-13184
OTS $1.10

DESCRIPTORS: Labeled substances, *Glucose, *Sucrose, *Phosphates, Tritium,

UCRL-11179
Lawrence Radiation Lab., Univ. of California, Berkeley.
BRAIN SEROTONIN AND BEHAVIOR IN SELECTED STRAINS OF RATS
Gordon T. Pryor. Thesis. Jan 64, 286p
Contract W7405-eng-48
OTS $3.50

N64-14866
National Aeronautics and Space Administration, Washington, D. C.
NASA PROGRESS IN LIFE SCIENCES
Hugh L. Dryden. 1964, 20p
Technical memo X-51344
OTS $1.60

Presented at the 5th Annual Lectures in Aerospace Medicine, Brooks AFB, Texas, 3 Feb 64.

AD-416 498
Retina Foundation [Boston, Mass.]
STUDIES OF CERTAIN BIOLOGICALLY IMPORTANT POLYANION-ORGANIC CATION COMPLEXES AS ENERGY TRANSFER SYSTEMS. Final rept.
Endre A. Balazs and D. S. Scheufele. 30 Apr 63, 75p
Contract AF19(604)8476
AFCRL-63-839; ARPA Order no. 171-62
OTS $7.60

DESCRIPTORS: *Mucopolysaccharides, Polymers, *Ion exchange resins, Sodium compounds, Ethylenes, *Sulfonates, *Complex compounds, *Dyes, *Biological stains, Absorption spectrum, Fluorescence, Spectra (Infrared), Spectra (Visible and ultraviolet).

Visible absorption spectra were made of glucosaminoglycan and galactosaminoglycan fractions and two molecular weight moieties of sodium polyethylene sulfonate complexed with Azure A dye. The parameters investigated were: method of preparation; polymer anionic site to dye ratio; temperature; solvent polarity; added electrolyte; pH; centrifugation; chloroform extraction; and time. Ultraviolet and fluorescent and infra-red spectra were also determined. Evidence for time dependent spectral shifts and metachromasia without a substrate were obtained. (Author) (See also AD-284 683)

Botany

BNL-6203
Brookhaven National Lab., Upton, N. Y.
THE EFFECTS OF CHRONIC GAMMA IRRADIATION ON THE APICAL MERISTEM AND BUD FORMATION OF TAXUS MEDIA
J. P. Miksche, A. H. Sparrow, and Anne F. Rogers
27 Jul 62, 21p
Contract AT(30-2)GEN-16
OTS $2.60

DESCRIPTORS: *Plants (Botany), *Trees, Gamma rays, *Radiation effects.

TID-17446
New York Botanical Garden, N. Y.
MECHANISMS OF ACTION OF X-RADIATION ON PLANTS. Progress rept.
Richard M. Klein. 7 Dec 62, 8p
Contract AT(30-1)2587
OTS $1.10

DESCRIPTORS: *X rays, *Plants (Botany), Physiology, *Radiation damage, *Infrared radiation,

TID-16254
Yale Univ., New Haven, Conn. School of Forestry.
CHRONIC GAMMA IRRADIATION OF A PITCH PINE-OAK FOREST ITS PHYSIOLOGICAL AND GENETICAL EFFECTS ON SEXUAL REPRODUCTION
Francois Mergen and G. R. Stairs. 9 Jul 62, 35p
Contract AT(30-1)2755
OTS $3.60

DESCRIPTORS: *Radiation effects, *Forestry, *Gamma rays

Medical Specialties and Equipment

PB-165 202
[Army Natick Labs.] Mass.
PROTECTION AND FUNCTIONING OF THE HANDS IN COLD CLIMATES. A CONFERENCE SPONSORED BY THE HEADQUARTERMASTER RESEARCH AND DEVELOPMENT COMMAND, U. S. ARMY QUARTERMASTER CORPS, NATICK, MASSACHUSETTS, APRIL 23-24, 1956.
Frank R. Fisher, ed. 1957, 185p
Available from Army Natick Labs., Mass. until stock is exhausted then order from OTS $13.00

DESCRIPTORS: *Arms, *Cold weather tests, *Body fluids, *Joints (Physiology), Heat transfer, *Body temperature, Psychology, Anthropology, *Perception, *Touch, *Human engineering, Anatomy, Remote control systems, Protective coverings, *Heaters, *Surgical instruments, *Gloves.

Contents:
Effects of cold on hand activities, with special reference to joints and fluid viscosities, by John Hunter
Heat transfer through the hand, by G. W. Molnar
General body cooling and hand cooling, by J. P. Meehan
Effect of temperature on manual performance, by E. Ralph Dusek
Tactile sensitivity in the cold, by A. W. Mills
The effects of equipment design on manual performance, by John Lyman
Kinesiological parameters of the hand, by M. Gladys Scott
Conceptual models for operational requirements, by Thomas B. Sheridan
Remote manipulation, by W. Thompson
Second skin project, by Herbert Meyer
The thermit type heat cartridge, by K. W. Hanlon
Development of a new instrument for cardiac surgery, by Austin R. Baer
Principles of handwear design in relation to functional capability, by S. J. Kennedy

N64-15352
Naval School of Aviation Medicine, Pensacola, Fla.
A SIGNAL CONDITIONER AND ELECTRODE TECHNIQUE FOR NYSTAGMUS MEASUREMENTS
W. Carroll Hixson and Jorma I. Niven. 6 Mar 63, 18p
NASA Order R-37
Proj. MR005.13-6001; NASA CR-55167
OTS $1.60

N64-15353
Naval School of Aviation Medicine, Pensacola, Fla.
A BIOINSTRUMENTATION CONTROL CENTER FOR THE HUMAN DISORIENTATION DEVICE. Final rept.
W. Carroll Hixson and Jorma I. Niven. 11 Mar 63, 57p
NASA Order R-1
Proj. MR005.13-6001, R-79; NASA CR-55615
OTS $5.60

Microbiology

N64-15387
Melpar Inc., Falls Church, Va.
DETECTION OF EXTRATERRESTRIAL LIFE. METHOD II: OPTICAL ROTARY DISPERSION. Final rept. [1963] 47p
Contract NASw-557
NASA CR-55657
OTS $4.60

N64-16109
Melpar, Inc., Falls Church, Va.
RESEARCH ON DETECTION OF EXTRATERRESTRIAL LIFE BY ULTRAVIOLET SPECTROPHOTOMETRY. Final rept. Jan 64, 60p
Contract NASw-571
NASA-CR-55655
OTS $5.60

Pathology

TID-16248
Argonne National Lab., Ill.
INFLUENCE OF DTPA THERAPY ON LONG-TERM EFFECTS OF RETAINED PLUTONIUM
Marcia W. Rosenthal, Joan F. Fried, and Arthur Lindenbaun, and Jack Schubert. May 62, 18p
Contract W31-109-eng-38
OTS $1.60

DESCRIPTORS: *Plutonium, *Excretion,

NAS-NRC-1182
Committee on Shock, NAS-NRC, Washington, D. C.
ANNOTATED BIBLIOGRAPHY ON SHOCK, 1950-1962
Benjamin W. Zweifach. 1963, 212p
Contracts DA49-193-MD-2077 and PH43-62-167
NAS-NRC $4.00

DESCRIPTORS: *Bibliographies, *Abstracts, *Shock (Pathology), Reviews,

AD-426 228
Texas Univ. Medical Branch, Galveston.
SIMPLIFIED STANDARDIZED TREATMENT OF BURNS UNDER EMERGENCY CONDITIONS WITH PARTICULAR REFERENCE TO ALLIED HEALTH PERSONNEL
T. G. Blocker, Jr. and Virginia Blocker. [1963] 66p
Contract OCD-OS-62-129
N64-14324
OTS $1.75

DESCRIPTORS: *Burns, Therapy, Disasters, *Medical personnel.

A discussion is given of burn therapy to assist in planning for training of members of allied health professions and to evaluate their utilization under medical supervision during the early phases of definitive care under austerity conditions.

Radiobiology

ANL-6769
Argonne National Lab., Ill.
RADIOLOGICAL PHYSICS DIVISION. SUMMARY REPT. JULY 1962-JUNE 1963, Dec 63, 246p
Contract W31-109-eng-38
OTS $3.00

TID-4201
Atomic Energy Commission, Washington, D. C. Div. of Biology and Medicine.
RESEARCH AND DEVELOPMENT IN PROGRESS, BIOLOGY AND MEDICINE, NOVEMBER 1963. Issue no. 2, 329p
OTS $1.00

PNE-226F
Brigham Young Univ., Provo, Utah.
CLOSE-IN EFFECTS OF AN UNDERGROUND NUCLEAR DETONATION ON SMALL MAMMALS AND SELECTED INVERTEBRATES. Final rept. on Proj. SEDAN
Donald M. Allred, D. Elden Beck, and Clive D. Jorgensen. 1 Jan 63, 26p
OTS $0.50

BNL-6276
Brookhaven National Lab., Upton, N. Y.
THE EFFECT OF A DEUTERON MACROBEAM ON GREYING OF HAIR
Howard J. Curtis. 12 Sep 62, 13p
Contract AT(30-2)GEN-16
OTS $1.60

DESCRIPTORS: *Deuteron beams, *Hair.

TID-19293
Chile Univ., Santiago.
AN IMMUNOGENETIC STUDY OF THE MECHANISMS OF PROTECTION AGAINST RADIATION DEATH BY TREATMENT WITH HAEMOPOIETIC TISSUES. Research rept. for 1 Dec 62-31 Jul 63
Gustavo Hoecker. [1963] 10p
Contract AT(30-1)2488
OTS $1.10

DESCRIPTORS: *Mice, *Radiation effects, Bone marrow

HW-SA-2737
Hanford Atomic Products Operation, Richland, Wash.
RADIOISOTOPES IN THE BODY: DIAGNOSIS AND TREATMENT
W. D. Norwood [1962] 10p
Contract AT(45-1)1350
OTS $1.10

DESCRIPTORS: *Radiobiology.

PB-163 554
Hektoen Inst. for Medical Research, Chicago, Ill.
HISTOPATHOLOGIC EVALUATION OF EFFECT OF DIET ON RESISTANCE TO RADIATION DAMAGE AND TO DEVELOPMENT OF ATHEROMATOUS LESIONS. Rept. no. 4(Final), 1 Nov 58-31 Oct 59
Paul B. Szanto, Leo Williams, Jr., Aldo F. Pedroso, and Justo M. Dominguez. [1959] 102p
Contract DA19-129-qm-1334
QMFCIAF File no. N-1131; AD-246 422
OTS $9.10

DESCRIPTORS: *Radiation effects, *Histological techniques, *Diet, Tissues (Biology), Testes, Liver, Spleen, Adrenal glands, Bone marrow, Intestines, Gastrointestinal system, *Atherosclerosis, Reproductive system.

This report summarizes the histologic evaluation of the morphologic findings on guinea pigs receiving two types of diet. It also describes the morphologic alterations which took place in the same animals receiving two different types of diet and total body irradiation. The specimens received by the Department of Pathology, Cook County Hospital, consisted of representative tissue pieces taken from all major visceral organs, brain, and testes, from 123 mature male guinea pigs. In accordance with the original planning, certain target organs were thoroughly studied by numerous histologic sections. The target organs of all 123 animals were examined with great care. The target organs were testes, lymph nodes, bone marrow, spleen, liver, adrenal glands, and gastrointestinal tract. The fixatives employed upon the testes and gastrointestinal tract were formalin and acetone; lymph nodes and spleen were fixed in formalin, acetone, Zenker's and Carnoy's solutions; liver, adrenals, and bone marrow were fixed in formalin and Zenker's. All sections were stained with hematoxylin and eosin. In addition, special stains (PAS, Mallory's, analine blue, Van Gieson's elastica, Cresylecht violet) were used frequently. All sections were read without knowledge as to which group they belonged, even though this information was available. (Author)

N64-13186
Naval School of Aviation Medicine, Pensacola, Fla.
THE DECEMBER 1962 REPORT OF THE RBE COMMITTEE TO THE ICRP AND ICRU IN ITS IMPLICATIONS FOR THE ASSESSMENT OF PROTON RADIATION EXPOSURE IN SPACE.
Research rept.
Herman J. Schaefer. 18 Oct 63, 16p
Proj. no. MR005.13-1002, R-26; NASA Order R-75
NASA CR-55189
OTS $1.60

N64-15902
Northrop Space Labs., Hawthorne, Calif.
INVESTIGATION OF PEROGNATHUS AS AN EXPERIMENTAL ORGANISM FOR RESEARCH IN SPACE BIOLOGY. Quarterly progress rept. no. 1, 1 Oct-31 Dec 63
J. J. Gambino and R. G. Lindberg. [1963] 12p
Contract NASw-812
NSL-64-29-1; NASA CR-55553
OTS $1.60

TID-15755
Philadelphia General Hospital, Pa.
THE EFFECT OF X-RAY IRRADIATION OF THE LIPIDS OF THE LIVER MITOCHONDRIA
H. P. Schwarz, L. Dreisbach, M. Barrionuevo, A. Kleschick, and I. Lostyk. 3 Aug 62, 10p
Contract AT(30-1)1864
OTS $1.10

DESCRIPTORS: *Lipids, *Radiation effects, *Liver, X-rays, Microsomes.

PB-163 555
Vanderbilt Univ., Nashville, Tenn. School of Medicine.
PROTECTIVE EFFECTS OF CERTAIN NATURAL FOODS AGAINST WHOLE-BODY IRRADIATION. Rept. no. 9(Final), 14 Oct 58-31 Jan 61
William J. Darby, Frank R. Blood, John G. Coniglio, George A. Elliott, and Thelma G. Turner. [1961] 20p
Contract DA19-129-qm-1307
QMFCIAF File no. N-1130
OTS $1.60

DESCRIPTORS: *Radioprotective agents, *Food, Primates, *Diet, X-rays, Radiation sickness, Life span.

Eighteen Rhesus monkeys were maintained on an adequate, purified diet for a year and then divided into two groups: (1) Four males and four females were continued on the purified diet: (2) Five males and five females were fed Purina Monkey chow plus some natural foods (Swiss chard, carrots, apples and bananas) instead of the purified diet. After eight weeks all animals were given 700 r total-body x-irradiation. Combined data for males and females show that out of eight animals on the purified diet, only two survived longer than 35 days post-irradiationally. Out of ten animals fed the monkey chow plus natural foods, six survived longer than 35 days. Slight weight loss was experienced after irradiation, and those animals surviving 35 days showed the smallest weight loss. Weight loss was paralled by decrease in food intake post-irradationally. The two groups had similar hematological responses to the irradiation (i.e., decreased leucocyte counts, decreasec hematocrits, and decreased hemoglobin concentration) (Author)

CHEMISTRY

TID-7675
Atomic Energy Commission, Oak Ridge, Tenn. Div. of Technical Information Extension.
PROCEEDINGS OF THE PROTACTINUM CHEMISTRY SYMPOSIUM HELD AT GATLINBURG, TENNESSEE, APRIL 25-26, 1963. SPONSORED BY OAK RIDGE NATIONAL LABORATORY.
Feb 64, 172p
Contract W7405-eng-26
OTS $2.75

BNL-6278
Brookhaven National Lab., Upton, N. Y.
MOLECULAR GEOMETRY AND THE VAPOR PRESSURES OF THE ISOTOPIC ETHYLENES: CHEMICAL AND STRUCTURAL ISOMERS
Jacob Bigeleisen, Slobodan V. Ribnikar, Marvin J. Stern, and W. Alexander Van Hook. 12 Sep 62, 21p
Contract AT(30-2)GEN-16
OTS $1.60

DESCRIPTORS: *Ethylenes, *Molecular isomerism

CONF-20-28
General Electric Co., Cincinnati, Ohio.
ON RARE EARTH BORATES OF COMPOSITION $3R_2O_3.B_2O_3$
S. F. Bartram. [1962] 22p
Contract AT(11-1)171
TM-63-2-17
OTS $2.60

Third Rare Earth Conference, Clearwater, Fla., Apr 63

DESCRIPTORS: *Lanthanum, *Rare earths, *Borates, Crystal structure

TID-19121
Institute of Metals and Explosives Research, Univ. of Utah, Salt Lake City.
CHARACTERIZATION OF SURFACE HYDROXYLS ON SILICA GELL USING AN INFRARED GRID TECHNIQUE. Technical rept. no. 5
F. A. Olson, D. A. Reese, and M. E. Wadsworth. 3 Jul 63, 61p
Contract W7405-eng-26
OTS $6.60

DESCRIPTORS: *Silicon, *Oxides, *Hydroxides.

N64-15785
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE POTENTIAL ENERGY CURVE OF THE LOWEST LYING TRIPLET SIGMA STATE OF LITHIUM HYDRIDE
Howard S. Taylor. 15 Aug 63, 16p
Contract NAS7-100
Technical rept. no. 32-493; NASA CR-53060
OTS $1.60

N64-15789
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TRANSIENT TECHNIQUES FOR DETERMINING THE THERMAL CONDUCTIVITY OF HOMOGENOUS POLYMERIC MATERIALS AT ELEVATED TEMPERATURES
Robert G. Nagler. 20 Jan 64, 21p
Contract NAS7-100
Technical rept. no. 32-552; NASA CR-53071
OTS $2.60

TID-19131
Kansas Univ., Lawrence.
RADICAL ION INTERMEDIATES IN THE ELECTROREDUCTION OF TRIPHENYLMETHANE DYES
Terry Miller, Barbara Lamb, and Ralph N. Adams. [1963] 15p
Contract AT(11-1)686
OTS $1.60

DESCRIPTORS: *Methanes, *Dyes, *Phenyl radicals.

UCRL-6816-T
Lawrence Radiation Lab., Univ. of California, Livermore.
INTERMETALLIC 2-17 STOICHIOMETRY
Quintin C. Johnson. 3 Aug 62, 9p
Contract W7405-eng-48
OTS $1.10

DESCRIPTORS: *Intermetallic compounds.

LADC-5143
Los Alamos Scientific Lab., N. Mex.
NONSTOICHIOMETRY IN INTERMETALLIC COMPOUNDS
Guy R. B. Elliott and Joe Fred Lemons. [1962] 22p
Contract W7405-eng-36
OTS $2.60

DESCRIPTORS: *Intermetallic compounds, *Cerium alloys, *Cadmium alloys, Phase studies.

CONF-151-2
Michigan Univ., Ann Arbor.
VARIATION OF THE HALF-WAVE POTENTIAL OF ORGANIC COMPOUNDS WITH pH. Rept. no. 78
Philip J. Elving. 21 Jun 63, 73p
Contract AT(11-1)1148
OTS $7.60

Nineteenth International Union of Pure and Applied Chemistry Congress, London

DESCRIPTORS: *Polarographic analysis,*Organic compounds,

IDO-11056
Monsanto Research Corp., Everett, Mass.
CATALYTIC HYDROCRACKING OF POLYPHENYL SYSTEMS FOR USE IN RECLAMATION OF ORGANIC NUCLEAR REACTOR COOLANT
D. A. Scola and R. Kafesjian. 30 Jun 63, 113p
Contracts AT(11-1)705 and AT(10-1)1088
OTS $2.25

K-1590
Oak Ridge Gaseous Diffusion Plant, Tenn.
INSTRUMENTATION FOR MEASURING FREEZING POINTS OF URANIUM HEXAFLUORIDE-HYDROGEN FLUORIDE SAMPLES
M. J. Bartkus. 12 Mar 64, 14p
Contract W7405-eng-26
OTS $0.50

ORNL-3537
Oak Ridge National Lab., Tenn.
ANALYTICAL CHEMISTRY DIVISION. ANNUAL PROGRESS REPT. FOR PERIOD ENDING NOVEMBER 15, 1963. [Feb 64] 160p
Contract W7405-eng-26
OTS $2.75

ORNL-3560
Oak Ridge National Lab., Tenn.
OUTGASSING BEHAVIOR OF EGCR MODERATOR GRAPHITE
J. P. Blakely and L. G. Overholser. Feb 64, 43p
Contract W7405-eng-26
OTS $1.25

ORNL-3548
Oak Ridge National Lab., Tenn.
PURIFICATION OF DI(2-ETHYLHEXYL) PHOSPHORIC ACID
J. M. Schmitt and C. A. Blake, Jr. [Feb 64] 13p
Contract W7405-eng-26
OTS $0.50

ORNL-3544
Oak Ridge National Lab., Tenn.
REDUCTION OF URANIUM HEXAFLUORIDE RETENTION ON BEDS OF MAGNESIUM FLUORIDE USED FOR REMOVAL OF TECHNETIUM HEXAFLUORIDE
Sidney Katz. [Feb 64] 11p
Contract W7405-eng-26
OTS $0.50

SC-4783(RR)
Sandia Corp., Albuquerque, N. Mex.
CHEMICAL AND RADIOCHEMICAL ANALYTICAL PROCEDURES
R. J. Everett, L. W. Brewer, G. W. Edwards, A. J. Jack, and T. A. Linn, Jr. Feb 64, 74p
OTS $2.00

DP-842
Savannah River Lab., Aiken, S. C.
FLUORIDE COMPLEXING OF U(VI) AND Pu(IV) IN SOLUTIONS CONTAINING Al(III) AND Zr(IV)
Carl S. Schlea and John T. Lowe. Jan 64, 18p
Contract AT(07-2)1
OTS $0.50

TID-19307
Stanford Research Inst., Menlo Park, Calif.
SORPTION OF GASES ON METAL SURFACES IN ULTRAHIGH VACUUM. Quarterly progress rept. no. 4, 15 Feb-15 May 63. 26 Jun 63, 20p
Contract AT(04-3)425
SRI Proj. no. PAU-3994
OTS $1.60

DESCRIPTORS: *Molybdenum, *Foils, *Nitrogen, Sorption, Hydrogen, Deuterium,

TID-19068
Vienna Univ. (Austria)
ION EXCHANGE SEPARATION OF URANIUM AND THORIUM IN NON-AQUEOUS AND MIXED MEDIA. Progress rept.
Johann Korkisch. Apr 63, 54p
Contracts IAEA 67/US and AT(30-1)2690
OTS $5.60

DESCRIPTORS: *Uranium, *Thorium, *Ion exchange

Physical Chemistry

PB-165 241
Naval Ordnance Test Station, China Lake, Calif.
PROPERTIES OF THE OXIDIZERS LITHIUM CHLORATE, LITHIUM PERCHLORATE, AND THEIR MIXTURES
Louis R. Rapp and William D. White. 27 Mar 52, declassified 28 Jun 57, 18p
NAVORD rept. 1964; NOTS 534
OTS $1.60

DESCRIPTORS: *Underwater propulsion, *Oxidizers, Fused materials, *Lithium compounds, *Chlorates, *Perchlorates, Chemical properties, Phase studies, Density, Surface tension, Absorption (Physical), Solubility.

Molten lithium chlorate, molten lithium perchlorate, and mixtures of the two substances were considered as potential oxidizers for hydropropulsion systems. Some of the properties related to their use in gas generators were investigated. Among these properties were density of the molten salts, viscosity, surface tension, rate of moisture absorption, and water solubility. Preliminary studies were made of the composition diagrams of the systems lithium chlorate-lithium per-

chlorate and lithium chlorate-lithium perchlorate-water. The results indicate that the systems have good potentialities as relatively low-melting, molten oxidizers with high oxygen density. (Author)

PB-165 242
Naval Ordnance Test Station, China Lake, Calif.
THEORETICAL PERFORMANCE CALCULATIONS ON CHEMICAL STEAM GENERATORS WITH LITHIUM CHLORATE, LITHIUM PERCHLORATE, AND THEIR MIXTURES AS MOLTEN OXIDIZERS FOR LITHIUM
Louis R. Rapp, William D. White, and Alexander B. Arranaga. 1 Jun 52, declassified 28 Jun 57, 40p
NAVORD rept. 1973; NOTS 546
OTS $3.60

DESCRIPTORS: *Underwater propulsion, Steam, Fused materials, Lithium, *Oxidizers, *Lithium compounds, *Chlorates, *Perchlorates, *Thermochemistry, Entropy, Enthalpy, Specific heat.

Consideration is given to the potential usefulness of molten lithium chlorate, lithium perchlorate, and mixtures of the two substances as oxidizers for molten lithium in hydropropulsion applications. The theoretical performance to be obtained through the use of the systems lithium-lithium chlorate-free water and lithium-lithium perchlorate-free water in steam generators operating on a 20.4 to 1 expansion ratio, and a simplified method of calculating the performance of the lithium-mixed oxidizer system are discussed. Comparison of the performance of the systems containing lithium chlorates and perchlorates with the performance of the systems lithium-free water and lithium-hydrogen peroxide indicates that the free-water system is considerably superior to the others on a weight basis; however, it is necessarily limited to applications allowing the production of noncondensable gases. In terms of volume, the three oxidizer-carried systems are equivalent to the free-water system with the added advantages of condensable exhaust and smaller amount of solids in the exhaust products. (Author)

AD-297 775
San Jose State Coll., Calif.
HIGH TEMPERATURE EQUILIBRIUM PROPERTIES OF TRANSITION METAL HALIDES. Final rept.
Laurence E. Wilson. 1 Feb 63, 7p
Grant DA-ORD-31-124-60-G60
AROD no. 2757:1
OTS $1.10

DESCRIPTORS: *Rhenium compounds, *Chlorides, *Sublimation, Entropy, Vapor pressure, *Thermochemistry, Transition elements, Halides

An extremely anomalous unpublished value had been obtained for the standard entropy of sublimation of rhenium(III) chloride in another laboratory and this value demanded checking. These objectives were achieved in only very modest measure. Nonetheless, considerable insight was gained into the sublimation characteristics of rhenium(III) chloride. Essentially all of the information which was obtained was through the measurement of sublimation pressures of samples of rhenium(III) chloride contained in Pyrex and quartz diaphragm gauges. (Author)

AD-288 064
Acoustics and Seismics Lab., Univ. of Michigan, Ann Arbor.
PROBLEMS IN SEISMIC BACKGROUND NOISE.
VESIAC Advisory rept. Oct 62, 133p
Contract SD-78
Rept. no. 4410-32-X
OTS $10.50

DESCRIPTORS: *Conferences, *Seismographs, *Noise, *Seismic waves,

This document comprises a collection of current papers on problems which the seismic background presents to seismologists. The papers were written by authorities from universities, government agencies, and private companies, who participated in the VESIAC Special Study Conference on Problems in Seismic Background Noise. Authors' summaries are presented in an edited transcript of a portion of the conference proceedings. (Author)

PB-163 833
Chicago Univ., Ill.
TRADITION, SEASON, AND CHANGE IN A TURKISH VILLAGE. Research paper no. 82
John F. Kolars. Doctoral thesis. Aug 63, 219p
Contract Nonr-2300(09)
NAS-NRC Foreign Field Research Program rept. no. 15
Available from Chicago Univ., Ill. $4.00 when supply is exhausted, order from OTS $14.50

DESCRIPTORS: *Geography, *Turkey, *Agriculture, Rural areas, Sociology, Economics, Labor.

Villages studied provide a wide variety of both physical sites and agricultural activities, and range in population from about 300 to over 1,300. Topics critical to an understanding of these village agricultural systems which receive special consideration throughout this work are: (1) the ingredients that enter into the organization of village agriculture; (2) the processes of transition which certain farm villages have undergone in the last half-century; (3) the relationship of village agriculture to changing elements within the national milieu; and (4) the importance of variation in the natural environment in helping to explain current differences in the artificial landscapes and their accompanying agricultural activities found within the research area. (Author)

NAS-NRC-1089
Foreign Field Research Program, NAS-NRC, Washington, D. C.
RECENT CARBONATE SEDIMENTATION ON ALACRAN REEF, YUCATAN, MEXICO
Charles Morris Hoskin. 1963, 176p
Contract Nonr-2300(09)
Rept. no. 19; AD-412 368
NAS-NRC $2.50

DESCRIPTORS: *Marine geology, *Carbonate minerals, *Sedimentation, Reefs, *Coral reefs, *Mexico, Marine biology, Oceanology.

Hard parts from marine organisms composed or aragonite and calcite, and a trace of siliceous particles form Recent surface sediments on Alacran Reef, a living coral continental shelf atoll in the Gulf of Mexico. These surface sediments are sands and silts which contain minor amounts of gravel and clay-size particles. Within the three major environments of the reef, the windward reef, the leeward reef, and the lagoon, the proportion of each size grade in the sediments is a reflection of the depositional environment; coarse sediments accumulate in shallow, wave-washed areas, and fine sediments in deeper water. These three major environments have been subdivided into 19 biotopes, most of which are recognized by criteria of grain size and grain-type composition. (Author)

PB-163 740
Meteorological Satellite Lab., Weather Bureau, Washington, D.C.
A TECHNIQUE FOR PRECISE ANALYSIS FOR SATELLITE DATA: VOLUME I. PHOTOGRAMMETRY
Tetsuya Fujita. Jan 63, 113p
Rept. no. 14; N64-10011
OTS $9.60

DESCRIPTORS: *Satellites (Artificial), Meteorological satellites, Aerial photographs, *Photogrammetry, Mapping, Satellite attitude, Photographic analysis,

This report includes both theories and actual methods of precise rectification. First, the shape of the earth and the orbital characteristics of earth orbiting satellites are discussed leading into the three coordinate systems conveniently used in the analysis. A survey of the characteristics of TIROS-borne cameras is described in an attempt to show the nature of the distortions and the methods of their correction. Various map projections and their matching overlays which are designed to minimize the error coming from the use of improper projection are presented. Before the actual rectification is explained, the attitude of satellite with respect to the sun and the earth is described in order to determine the position of a satellite and the orientation of its spin axis before rectification is performed. Finally, the rectification methods are explained step by step dealing first with the precise method which can be performed if we have a landmark in one of the pictures belonging to a series to be rectified. Next, an approximate method applicable to any series of satellite photographs is explained. (Author)

NAS-NRC-1087
National Committee for the International Geophysical Year, NAS-NRC, Washington, D. C.
UNITED STATES IGY BIBLIOGRAPHY. AN ANNOTATED BIBLIOGRAPHY OF UNITED STATES CONTRIBUTIONS TO THE IGY AND IGC (1957-1959)
Frank M. Mason and Janet R. Terner (Science and Technology Div., Library of Congress), comp. Apr 63, 402p
IGY General rept. no. 18
NAS-NRC $3.00

DESCRIPTORS: *Bibliographies, *Abstracts, *Scientific research, *Scientific organizations, *Geophysics.

This bibliography is a compilation of 2,853 abstracts on the United States contribution to the International Geophysical Year (IGY), July 1957-December 1958, and the one-year extension of the IGY - International Geophysical Cooperation-1959 (IGC-59). The abstracts cover material published from 1953 through 1960. They are arranged in alphabetical order by author within subject categories conforming to the original IGY disciplines, except that several sections (General, Antarctic, Arctic, Aeronomy, and Interdisciplinary Research) have been added in order better to define the trend of the U. S. effort. The aeronomy section covers research on the temperature, pressure, density, and composition of the upper atmosphere. The section on interdisciplinary research contains material dealing with the exploration of the upper atmosphere and space, theoretical models of the atmosphere, and the Van Allen radiation belts. The section on rockets and satellites includes abstracts covering the tracking program, rocket and satellite instrumentation for the IGY experiments, and proposed scientific uses of these new tools of research; scientific results derived from rocket and satellite experiments, however, have been placed in the appropriate subject disciplines. (Author)

AD-430 350
Redstone Scientific Information Center, Redstone Arsenal, Ala.
TEKTITES: A BIBLIOGRAPHY
Charlotte F. Shenk. 15 Jan 64, supersedes rept. dated 1 Jan 63, 122p
RSIC rept. no. 107; N64-15809
OTS $10.10

DESCRIPTORS: *Bibliographies, *Meteorites, *Rock (Geology), Glass, Astrophysics, Moon

The bibliography consists of 771 references on tektites and some closely related subjects. Many entries are annotated, giving information about tektite origins, composition, discovery sites, ages, formation, and history. The material gathered is international in scope, covering the literature from the early 19th century through 1963. Titles and other bibliographical data generally appear in the languages of origin. The bibliography includes a separate author index. The entire work is designed for general service and as a check list in this and closely associated subjects. (Author)

Climatology and Meteorology

PB-165 250
Aerometric Research, Inc., Goleta, Calif.
QUANTITATIVE ASSESSMENT OF THE PERFORMANCE CHARACTERISTICS OF THE AIRWAYS TERMINAL FORECASTING SYSTEM. Final rept.
Raymond E. Kerr, Jr., John R. Thompson, and Robert D. Elliott. 15 Apr 62, 146p
Contract Cwb 10077
N62-12269
OTS $11.00

DESCRIPTORS: *Weather forecasting, *All-weather aviation, Cloud cover, Ceiling, Visibility, Errors, Statistical analysis, Meteorology, Civil aviation,

The purpose of this project was to evaluate the operational utility of terminal forecasts and to provide guidance for programs designed to improve the effectiveness and utility of terminal forecasts. Specific objectives were, (1) to perform a basic evaluation of the accuracy of the present 0-12 hour terminal forecasts during times of low ceilings and poor visibility, (2) to examine the causes of forecast errors with special reference to the physical processes that are associated with forecast errors of the greatest importance,and (3) to determine the operational utility of terminal forecasts for present and probable future operations. (Author)

PB-165 209
Army Missile [Command] Redstone Arsenal [Huntsville] Ala.
ABMA CLIMATOLOGICAL RINGBOOK. PART ONE: AMBIENT TEMPERATURE AS A FUNCTION OF ALTITUDE FOR TEN SELECTED STATIONS
William W. Vaughan. 19 Jun 59, 61p
Rept. no. DA-TR-8-59; AD-219 893
OTS $6.60

DESCRIPTORS: *Climatology, *Atmospheric temperature, Statistical functions, Weather stations, Guided missile trajectories, Handbooks.

The arithmetic mean and standard deviation (Sigma) ambient temperature values are presented as a function of altitude for 10 selected stations which include Germany, Greenland, Guam, Hawaii, Libya, Morocco, Panama Canal Zone, Philippine Islands, and Puerto Rico. The data were compiled during the process of investigation and evaluation of atmospheric data. (Author)

PB-165 210
Army Missile [Command] Redstone Arsenal, Huntsville, Ala.
ABMA CLIMATOLOGICAL RINGBOOK. PART TWO: AMBIENT DENSITY AS A FUNCTION OF ALTITUDE FOR TEN SELECTED STATIONS. 1 Sep 59, 63p
Rept. no. DA-TR-60-59; AD-227 170
OTS $6.60

DESCRIPTORS: *Climatology, *Atmosphere, *Density, Statistical functions, Weather stations, Guided missile trajectories, Handbooks.

The arithmetic mean and standard deviation (Sigma) ambient density values are presented as a function of altitude for 10 selected stations which include Germany, Greenland, Guam, Hawaii, Libya, Morocco, Panama Canal Zone, Phillipine Islands, and Puerto Rico. The data were compiled during the process of investigation and evaluation of atmospheric data for Army Ballistic Missile Agency missile applications. (Author) (See also PB-165 209)

PB-165 211
Army Missile [Command] Redstone Arsenal, Huntsville, Ala.
ABMA CLIMATOLOGICAL RINGBOOK. PART THREE: AMBIENT PRESSURE-HEIGHT DATA AS A FUNCTION OF ALTITUDE FOR TEN SELECTED STATIONS.
1 Sep 59, 61p
Rept. no. DA-TR-61-59; AD-227 139
OTS $6.60

DESCRIPTORS: *Climatology, *Atmosphere, *Barometric pressure, Statistical functions, Weather stations, Guided missile trajectories, Handbooks.

The arithmetic mean and standard deviation (Sigma) pressure-height values are presented as a function of constant pressure levels for 10 selected stations which include Germany, Greenland, Guam, Hawaii, Libya, Morocco, Panama Canal Zone, Philippine Islands, and Puerto Rico. The data were compiled during the process of investigation and evaluation of atmospheric data for the establishment of Army Ballistic Missile Agency missile applications. (Author) (See also PB-165 210)

PB-163 571
Cloud Physics Lab., Univ. of Chicago, Ill.
PROJECT WHITETOP. Rept. for 4 Apr 62-3 Apr 63
Roscoe R. Braham, Jr. 15 May 63, 55p
Grant NSF G-22419
N63-19233
OTS $5.60

DESCRIPTORS: *Cumulus clouds, *Clouds, Missouri, *Atmospheric precipitation, *Artificial precipitation, Silver, Iodide, Smokes, Phenols, Meteorology

Project Whitetop is a study of precipitation processes in the cumulus clouds of summertime Missouri. An integral part of Project Whitetop is a series of cloud seeding trials using silver-iodide smoke as the seeding agent. This report also concerns a series of winter stratus seeding experiments carried out during December 1962 and January 1963. The purpose of these experiments was to test a new seeding agent, an organic substance called phloroglucinol. (Author)

HW-79382
Hanford Atomic Products Operation, Richland, Wash.
RAIN SCAVENGING OF PARTICULATES
R. J. Engelmann. 1 Dec 63, 226p
Contract AT(45-1)1350
OTS $3.00

PB-163 728
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
ANALYSIS OF PROJECT HUGO TEST FIRING DEC. 5, 1958. APPENDIX. PHOTOGRAMMETRY AND MATHEMATICS OF ROCKET PHOTOGRAPH INTERPRETATION
Lester F. Hubert and John Schuetz. Aug 60, 54p
MSL rept. no. 2
OTS $5.60

DESCRIPTORS: *Sounding rockets, Rockets, Flight testing, *Aerial photography, Meteorological parameters, Photographic analysis, *Photogrammetry, Projective geometry, *Photo interpretation,

The purpose of Project HUGO is to photograph meteorological phenomena by means of a rocket-borne camera system. This report concerns the analysis performed on a test firing of this system on December 5, 1958 from the NASA facilities at Wallops Island, Virginia. It is concluded that large scale patterns are useful in deducing the atmospheric field of motion. It is also shown that smaller scales of motion resulting from local effects (such as heating from the Gulf Stream) imply motions that do not reflect planetary waves that

are deemed most important in standard synoptic analysis. It is further shown that albedo measurements from rocket photography can be successful only if the effects of spectral response of the film-filter system is known and the influence of the angle of view and the sun angle are taken into account. The appendix treats various aspects of projective geometry that are peculiar to photogrammetry with ultra-high altitude, high oblique photographs. (Author)

PB-163 739
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
CONFERENCE ON SFERICS MEASUREMENTS FROM SATELLITES HELD ON APRIL 27, 1962 IN WASHINGTON, D. C. AND SPONSORED BY THE NATIONAL WEATHER SATELLITE CENTER OF THE UNITED STATES WEATHER BUREAU
Stanley D. Soules, ed. Oct 62, 54p
Rept. no. 13; N63-15516
OTS $5.60

DESCRIPTORS: *Conferences, *Atmospherics, Measurement, *Satellites (Artificial), Reports,

A group of scientists from the fields of meteorology and atmospheric electricity were invited to present their thoughts and ideas on how the collection and study of world-wide sferics data from a satellite could assist the meteorologist in his understanding of the behavior of the atmosphere. Five speakers gave short talks on how sferics measurements might be made and how these data could be utilized. Their comments formed the basis for a general discussion among the other participants of the conference. (Author)

PB-163 745
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
AN INVESTIGATION OF METEOROLOGICAL SATELLITE CHARACTERISTICS FOR CONTINUOUS EARTH COVERAGE
Thomas I. Gray, Jr. and S. Fred Singer. Jul 63, 48p
M.S.L. rept. no. 19; N64-11656
OTS $4.60

DESCRIPTORS: *Meteorological satellites, *Aerial photography, Earth, Pictures, Optical properties, Orbital trajectories, Equations, *Weather forecasting, *Satellites (Artificial),

A systems analysis of orbital, optical, and meteorological characteristics of weather satellites in polar orbits shows that the ratio of the area viewed to the total earth area, in one day, becomes a maximum in the altitude range of 1000 to 2400 n.mi. (.3 to .7 earth radii). Frequency of viewing increases rapidly with latitude; if more frequent looks are required in the tropical zones, then an equatorial satellite can supplement a polar satellite system very effectively. For high resolution pictures involving narrow angle cameras, and therefore restricted fields-of-view, coverage can be improved by operating at "preferred" altitudes which provide suitably interleaved orbits. Resolution of the pictures taken at a given altitude can be improved either through increasing the number of lines on the television camera, or by sharing the field of view among several cameras having narrow angle lenses. Various useful expressions are derived and presented in graphical and tabular form showing the "worth" of a picture, as well as the uniformity of resolution, location errors and similar operational parameters, as a function of satellite altitude and picture format. The highest "worth" is obtained from a satellite in a 1500 n.mi. polar orbit. (Author)

PB-163 732
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
NIMBUS DATA UTILIZATION PLAN. Apr 61, 30p
MSL rept. no. 6
OTS $2.60

DESCRIPTORS: *Meteorological satellites, *Satellites (Artificial), Day, Night sky, Clouds, Pictures, Infrared radiation, Data processing systems, *Weather forecasting,

This data utilization plan is developed to exploit the inherent capabilities of the NIMBUS satellite to meet the research and operational requirements of the meteorological agencies participating in the satellite program. Experience gained in the various phases of the TIROS experiments provides a background for development of this plan. The measurements to be made on the first NIMBUS satellite were planned jointly by the National Aeronautics and Space Administration and the Meteorological Satellite Laboratory of the Weather Bureau, taking into consideration the requirements of the data-using organizations as well as technological and engineering capabilities. A description of these measurements is contained in other NIMBUS documents. Certain measurements planned for NIMBUS I are already known to have potential for immediate use in operational meteorological analysis and forecasting. These are: Daytime cloud cover measured by a three-camera vidicon system, and nighttime cloud cover measured by a high-resolution infrared scanner.

PB-163 726
Weather Bureau, Washington, D. C.
TIROS, THE FIRST WEATHER SATELLITE. [1963] 9p Prepared in cooperation with Goddard Space Flight Center, National Aeronautics and Space Administration
ORS $1.10

DESCRIPTORS: *Meteorological satellites, *Satellites (Artificial), *Weather forecasting, Instrumentation, Operation,

A general review of the instrumentation and achievements of the Tiros weather satellite is presented.

Geology

N64-14269
California Univ., La Jolla.
SHOCK EMPLACED ARGON IN A STONY METEORITE. PART I: SHOCK EXPERIMENT AND PETROLOGY OF SAMPLE. PART 2: A COMPARISON WITH NATURAL ARGON IN ITS DIFFUSION
Kurt Fredriksson, Paul De Carli, R. O. Pepin, J. H. Reynolds, and G. Turner. [1963] 21p
Grant NsG-317-63
NASA CR-55365
OTS $2.60

N64-14902
Lamont Geological Observatory, Columbia Univ., Palisades, N. Y.
NONDESTRUCTIVE NEUTRON-ACTIVATION ANALYSIS OF SMALL PARTICLES. Status rept. Mar-Aug 63
W. A. Cassidy. [1963] 121p
Grant NsG-232-62
NASA CR-55440
OTS $10.10

Physics of the Atmosphere

NASA-TR-R-141
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ON THE HEATING OF THE POLAR UPPER ATMOSPHERE
Kaichi Maeda. Dec 62, 66p
Grant NSF G-13999
N64-16005
OTS $1.75

N64-14905
Ionosphere Research Lab., Pennsylvania State Univ., University Park.
THE ANALYSIS OF IONOSPHERIC h'(f) RECORDS USING THE METHOD OF LEAST SQUARES
D. J. Brown. 1 Jan 64, 52p
Grants NsG-134-61 and NSF G-22040
Scientific rept. no. 202; NASA CR-55431
OTS $5.60

PB-163 729
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
PRELIMINARY STUDIES OF ATMOSPHERIC ENERGY PARAMETERS
Jay S. Winston. Jan 61, 33p
MSL rept. no. 3
OTS $3.60

DESCRIPTORS: *Thermodynamics, *Atmosphere, Energy, Thermal radiation, Atmospheric motion, Heat transfer, Northern Hemisphere, Analysis, Energy conversion.

In preparation for a study of the atmospheric response to variations in radiational heating to be measured from satellites, a preliminary investigation of the large-scale energetics of the planetary circulation over the Northern Hemisphere is undertaken. Among parameters being routinely computed and studied are the northward transport of heat across latitude circles, the related convergence of heat in latitude belts, and zonal and eddy components of kinetic and available potential energy. Some aspects of the conversion and generation of energy are also treated. An examination of the longitudinal contributions to northward heat transport gives much insight into the geographical and dynamical influences on heat transport which should be of importance in studying the relationship between heat transport and radiation. A clearcut, large-scale energy cycle is illustrated and its relation to heat transports, energy conversion, and regional variations in potential energy is discussed. (Author)

ANL-6734
Argonne National Lab., Ill.
TWO-PHASE (GAS-LIQUID) SYSTEM: HEAT TRANSFER AND HYDRAULICS. An annotated bibliography.
Robert R. Kepple and Thomas V. Tung. Jul 63, 433p
Contract W31-109-eng-38
OTS $5.00

WAPD-T-1510
Bettis Atomic Power Lab., Pittsburgh, Pa.
INTERPRETIVE REPORT OF PRESSURE VESSEL RESEARCH. SECTION 1.8: SIGNIFICANCE OF CALCULATED STRESSES
B. F. Langer. May 62, 20p
Contract AT(11-1)GEN-14
OTS $1.60

DESCRIPTORS: *Stresses, Mathematical analysis, *Pressure vessels

NAS-NRC-1099
Building Research Advisory Board, NAS-NRC, Washington, D. C.
COLD-STORAGE FACILITIES: A COMPREHENSIVE PROGRAM OF RESEARCH
James T. Lendrum. 1963, 26p
NAS-NRC $1.50

DESCRIPTORS: *Refrigeration systems, *Storage, Structures, Thermal insulation, Construction, Degradation, Test methods, Air, Moisture, Heat transfer, Research program administration.

AD-425 705
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
DEVELOPMENT AND FLIGHT CALIBRATION OF A VARIABLE-DRAG DEVICE ON A VARIABLE STABILITY T-33 AIRPLANE
F. D. Newell, B. H. Dolbin, and A. E. Schelhorn. Nov 63, 75p
Contract AF33(616)7517
CAL-TE-1462-F-3; ASD-TDR-62-910; N64-13627
OTS $2.00

DESCRIPTORS: *Aerodynamic control surfaces, *Low-drag airfoils, Aerodynamic characteristics, Design, Flight testing, Calibration, Airplanes, Hydraulic servomechanisms,

The criteria, design, installation and flight calibration of a variable drag system are discussed. The system allows for variable L/D characteristics in the variable stability T-33 airplane. With this system in the special T-33, the airplane will be used to investigate the interactions between handling qualities and many drag characteristics including very low L/D and shapes of L/D curve for high L/D ratios. (Author)

N64-15881
Cryogenic Engineering Lab., National Bureau of Standards, Boulder, Colo.
THE PERFORMANCE OF POINT LEVEL SENSORS IN LIQUID HYDROGEN
D. A. Burgeson, W. G. Pestalozzi (Arthur D. Little, Inc.), and R. J. Richards. [1963], 19p
NASA Order R-45
Rept. no. 292; NASA CR-55328
OTS $1.60

Presented at the 1960 Cryogenic Engineering Conference at the University of Colorado in Boulder, Aug 19-21, 1963.

N64-14890
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ASTRONAUTICS INFORMATION: TELEVISION, PHOTOGRAPHY, PHOTOMETRY, AND RADIOMETRY ADAPTABLE TO SPACE RECONNAISSANCE
Judith Hayes, comp. Nov 63, 308p
Contract NAS7-100
Literature research no. 490; NASA CR-53045
OTS $19.75

N64-15787
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DYNAMIC ANALYSIS OF STRUCTURAL SYSTEMS BY COMPONENT MODE SYNTHESIS
Walter C. Hurty. 15 Jan 64, 45p
Contract NAS7-100
Technical rept. no. 32-530; NASA CR-53057
OTS $4.60

UCRL-7515
Lawrence Radiation Lab., Univ. of California, Livermore.
FEASIBILITY OF USING NUCLEAR EXPLOSIVES TO EXTRACT WATER FROM LUNAR ROCKS
R. A. Heckman. 25 Sep 63, 16p
Contract W7405-eng-48
OTS $0.50

N63-22881
Martin-Marietta Corp., Baltimore, Md.
CONTROL, STABILITY AND NONLINEAR OSCILLATIONS. Final rept., 15 Mar 62-31 Mar 63
S. Lefschetz and J. P. LaSalle. 27 Sep 63, 15p
Contract NASr-103
NASA CR-52006
OTS $1.60

ORNL-3546
Oak Ridge National Lab., Tenn.
PRESTRESSING A TWO-LAYER PRESSURE VESSEL BY CONTROLLED YIELDING OF THE INNER LAYER
R. W. Schneider. Feb 64 28p
Contract W7405-eng-26
OTS $0.75

OTS SB-517
Office of Technical Services, Dept. of Commerce, Washington, D. C.
SANDWICH CONSTRUCTION. Sep 63, 17p
OTS Selective Bibliography SB-517
OTS $0.10

DESCRIPTORS: *Bibliographies, *Sandwich construction, Sandwich panels, Honeycomb cores, Airplane panels, Panels (Structural).

Lists 241 reports and translations on sandwich construction, sandwich panels and honeycomb cores added to the OTS collection during the period 1945 through September 1963. Covers data on the mechanical properties and testing of the various types of sandwich material. For Expanded Plastics see SB-524.

SC-4602(RR)
Sandia Lab., Albuquerque, N. Mex.
PLOWSHARE PROGRAM: Final rept. on Proj. SCOOTER
William R. Perret, Albert J. Chabai, Jack W. Reed, and Luke J. Vortman. Oct 63, 168p
OTS $2.75

Chemical Engineering

BNL-844(PR-6)
Brookhaven National Lab., Upton, N. Y.
HIGH-TEMPERATURE LIQUID-METAL TECHNOLOGY REVIEW. A bimonthly technical progress review, Volume 1, no. 6, Dec 63, 72p
PR-6
OTS $1.75

IDO-14616
Phillips Petroleum Co., Idaho Falls.
CHEMICAL PROCESSING TECHNOLOGY. Quarterly progress rept. for Jan-Mar 63.
J. R. Bower, ed. 9 Sep 63, 37p
Contract AT(10-1)205
OTS $0.75

DP-850
Savannah River Lab., Aiken, S. C.
OPERATING AND DESIGN VARIABLES OF AGITATED ION EXCHANGE BEDS
Milton W. Davis, Jr., Merle R. Klinger, and James F. Ward, Jr. Oct 63, 22p
Contract AT(07-2)1
OTS $0.50

Civil Engineering

PB-181 620
Bureau of Yards and Docks, Washington, D. C.
PAINT FORMULAS. Engineered Performance Standards, Public Works Maintenance
Aug 63, 127p
NAVDOCKS P-710.1, supersedes rept. of Oct 58, change 1 of Dec 58, and change 2 of Jun 61
OTS $2.75

DESCRIPTORS: *Paints, *Maintenance, *Job analysis, Standards.

PB-181 134, Rev.
Bureau of Yards and Docks, Washington, D. C.
PAINT HANDBOOK. Engineered Performance Standards, Public Works Maintenance Aug 63, 185p
NAVDOCKS P-710.0, supersedes NAVDOCKS P-710, dated Feb 61
OTS $3.00

DESCRIPTORS: *Paints, *Maintanence, *Job analysis, Standards, Handbooks.

Spread sheets are given which consist of task descriptions arranged by group time values by task area. The spread sheets are arranged in alphabetical order by task area. Task times are developed by combining operation times. These task times include all operation times constituting the task, but do not include job preparation, travel, or allowance for delays. Tasks are arranged in numerical order. (Author)

Electrical and Electronic Engineering

N64-14903
Alfred Univ., N. Y.
FUEL CELL RESEARCH: AN INVESTIGATION OF NON-STEADY-STATE OPERATION. Semiannual status rept. no. 1, Jun-Dec 63
T. J. Gray and A. A. Schneider. 15 Jan 64, 19p
Grant NsG-384
NASA-CR-52890
OTS $1.60

AD-298 581
Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF A 3 KW STIRLING CYCLE SOLAR POWER SYSTEM. VOLUME III. SOLAR COLLECTOR ANALYSIS AND EXPERIMENTAL RESEARCH. Interim rept. for Sep 59-Aug 60, on Energy Conversion Technology
D. L. Dresser, E. H. Hietbrink and others. Jan 63, 262p
Contract AF33(616)6771
WADD-TR-61-122, Pt. 3
OTS $17.00

DESCRIPTORS: *External combustion engines, *Solar panels, Auxiliary power plants, Power supplies, Absorption, Configuration, Energy conversion, Electric power production, Reflectors.

CONF-78-4
Argonne National Lab., Ill.
STABILITY OF A THERMIONIC ENERGY CONVERSION DIODE USING A LIQUID METAL ELECTRON COLLECTOR
A. J. Ulrich. [1963] 9p
Contract W31-109-eng-38
OTS $1.10

American Physical Society 1963 Summer Meeting, Buffalo, Jun 63

DESCRIPTORS: *Thermionic converters,

N64-16014
Atomics International, Canoga Park, Calif.
THE EFFECTS OF RADIATION ON NICKEL-CADMIUM BATTERY ELECTRODES. I. Final rept., 1 Jun-31 Dec 63
G. R. Argue, H. L. Recht, W. A. McCollum, and D. E. McKenzie. 6 Feb 64, 48p
Rept. no. AI-64-11; NASA CR-55760
OTS $4.60

N64-15867
Clevite Corp., Cleveland, Ohio.
STUDY OF THIN FILM LARGE AREA PHOTOVOLTAIC SOLAR ENERGY CONVERTER. Quarterly rept. no. 1, 1 Oct-31 Dec 63
Warren J. Deshotels, Frank Augustine, and John Koenig. 23 Jan 64, 37p
Contract NAS3-2795
NASA CR-55959
OTS $3.60

NAS-NRC-1139
Conference on Electrical Insulation, NAS-NRC, Washington, D. C.
DIGEST OF LITERATURE ON DIELECTRICS. VOLUME 26, 1962
Daniel Berg and John C. Devins, ed. 1 Aug 63, 352p
AROD-3935:3; AD-424943; N64-14182
NAS-NRC $ 15.00

DESCRIPTORS: *Conferences, *Bibliographies, *Dielectrics, *Electric insulation, Dielectric properties, Dipole moments, Relaxation time, Resistance (Electrical), Solids, Liquids, Gases, Ferroelectric materials, Piezoelectric crystals, Polymers, Plastics, Dielectric films, Electrical equipment.

Contents:
Instrumentation and measurements
Tables of dielectric constants, dipole moments, and dielectric relaxation times
Molecular and ionic interactions in dielectrics
Conduction in solid dielectrics
The breakdown of dielectrics
Ferroelectric and piezoelectric materials
High polymeric materials
Insulating films and fibrous materials
Insulating liquids and application
Inorganic insulation
Applications

PB-165 248
Cornell-Dubilier Electric Corp., New Bedford, Mass.
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200°C. Quarterly rept. no. 4 ending 27 Apr 62
L. E. Nordquist. [1962] 13p
Contract DA36-039-sc-85955
OTS $1.60

DESCRIPTORS: *Capacitors, *Ceramic capacitors, Manufacturing methods, *Barium compounds, *Titanates, *Fluorination, *Encapsulation.

The superiority of fluorinated capacitors was established. Improvements reflected in life time, aging rates and operating temperatures are demonstrated. No difference in life time of fluorinated capacitors made with $BaTiO_3$ manufactured from domestic or foreign $BaCO_3$ was observed during a recent accelerated life test. Bulk fluorination process is adequate for required production rates. Glass encapsulated capacitors have proven to be a satisfactory method of assembly for 200° operation. (Author) (See also AD-273 424)

AD-291 442
David Sarnoff Research Center, Princeton, N. J
OPTIMUM DESIGN OF INDUCTANCE-LESS FILTERS USING A COMBINATION OF IDENTICAL R-C COUPLED AMPLIFYING STAGES. Rept. for 1 Nov 61-1 Mar 62, on Molecular Band Pass and Tunable Amplifiers
Judea Pearl. Jul 62, 28p
Contract AF33(616)8491
ASD-TDR-62-861
OTS $2.60

DESCRIPTORS: *Band-pass amplifiers, *Band-pass filters, *Tuned amplifiers, *Microminiaturization (Electronics), *Molelectronics, Delay lines, Semiconductors, Mathematical analysis, Polynomials.

The feasibility of interconnecting many identical stages of low-Q low-gain band-pass amplifiers to constitute a high selectivity filter is studied. The mathematical problem of obtaining the narrowest band-width, and the highest rejection ratio, for a given number of stages is formulated. A solution is given for two classes of networks where the optimum properties of Tchebyscheff polynomials are applicable. Examples for the optimum combination of band pass stages, low pass stages, and the output sensors of a semiconductor delay line are given. It was found that an improvement of selection may be obtained by linear combination of signals from all the cascaded stages rather than by utilization of the last stage only. Weighting the outputs obtained from delay line sensors results in a better frequency response than that of a uniform delay line filter. (Author)

N63-21048
Duke Univ., Durham, N. C.
STATIC DC TO SINUSOIDAL AC CONVERSION
T. G. Wilson [1962] 18p
Grant NsG-152-61
NASA CR-50938
OTS $1.60

N64-15534
Electro-Optical Systems, Inc., Pasadena, Calif.
HYDROGEN-OXYGEN ELECTROLYTIC REGENERATIVE FUEL CELLS
Harvey Frank. 18 Jan 64, 30p
Contract NAS3-2781
EOS Rept. 4110-QL-2; NASA CR-55650
OTS $3.60

N64-15878
General Electric Co., Waynesboro, Va.
STUDY OF CAPACITORS FOR STATIC INVERTERS AND CONVERTERS. Quarterly rept. no. 1, 16 Aug-16 Nov 63
J. F. Scoville. [1963] 15p
Contract NAS3-2788
T.I.S. R63SCW-31-1; NASA CR-55745
OTS $1.60

N64-15786
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EXCITATION OF HIGHER ORDER MODES BY A STEP DISCONTINUITY OF A CIRCULAR WAVEGUIDE
Cavour Yeh. 1 Feb 64, 17p
Contract NAS7-100
Technical rept. no. 32-496; NASA CR-53062
OTS $1.60

UCRL-10196
Lawrence Radiation Lab., Univ. of California, Berkeley.
A WIDEBAND GAIN CONTROL
Larry Scott. 26 Apr 62, 10p
Contract W7405-eng-48
OTS $1.10

DESCRIPTORS: *Pulse amplifiers, *Gain (Electrical), *Electronic equipment,

N64-16104
Naval Ammunition Depot, Crane, Ind.
EVALUATION PROGRAM FOR NICKEL CADMIUM SEALED CELLS: GENERAL PERFORMANCE TEST OF GENERAL ELECTRIC COMPANY 3.0 AMPERE HOUR CELLS
E. C. Bruess. 6 Jan 64, 40p
Rept. QE/C 64-1; NASA CR-55630
OTS $3.60

N64-13400
Pennsylvania Univ., Philadelphia.
THE OPTIMIZATION OF MHD GENERATORS WITH ARBITRARY CONDUCTIVITY
Hsuan Yeh and Tsu-Kai Chu. [1963] 39p
Grant NsG-316
NASA CR-55183
OTS $3.60

N64-13335
Radiation Lab., Univ. of Michigan, Ann Arbor.
ANALYTICAL STUDIES OF RELATIONSHIPS BETWEEN FARFIELD RADIATION PATTERNS AND NEAR-FIELD CURRENT DISTRIBUTIONS AND. SURFACE CONFIGURATION OF THE EFFECTS OF SMALL-VEHICLE (FEW WAVELENGTHS) ON ANTENNA PERFORMANCE. Semi-annual progress rept. no. 1, 1 May-1 Nov 63
T. B. A. Senior. 20 Nov 63, 6p
Grant NsG-444
Rept. 5780-1-T; NASA CR-55191
OTS $1.10

SCTM-109-63(13)
Sandia Lab., Albuquerque, N. Mex.
THE ELECTROLUMINESCENT DISPLAY OF TIME (ELDOT) SYSTEM
L. C. Meyer and F. E. Perusich. May 63, 35p
Contract AT(29-1)789
OTS $3.60

DESCRIPTORS: *Display systems, *Time, Measurement

PB-163 513
TYCO Labs., Inc., Waltham, Mass.
POWER DENSE THERMOELECTRIC MODULE. Monthly letter-type progress rept. no. 6, 9 Dec 61-8 Jan 62
A. I. Mlavsky. 15 Jan 62, 5p
Contract NObs-86015
OTS $1.10

DESCRIPTORS: *Semiconductor devices, *Thermoelectricity, *Bonding, *Iron, *Lead compounds, *Tin compounds, *Tellurides, Thermal stresses, *Modules (Electronic).

Twenty-five samples of N-type lead telluride of various lengths were diffusion-bonded to iron electrodes. The effect of oxidation and heat treatment on the electrical properties of Fe-SnTe-PbTe thermo-elements was investigated. The pertinent data is given in Tables. (See also PB-163 512)

PB-163 514
TYCO Labs., Inc., Waltham, Mass.
POWER DENSE THERMOELECTRIC MODULE. Monthly letter-type progress rept. no. 7 and 8, 9 Jan-8 Mar 62
A. I. Mlavsky. 12 Mar 62, 6p
Contract NObs-86015
OTS $1.10

DESCRIPTORS: *Semiconductor devices, *Thermoelectricity, *Bonding, *Iron, *Lead compounds, Tin compounds, *Tellurides, Thermal stresses, *Modules (Electronic).

Processes for bonding electrodes to PbTe alloys are described. Particular attention is given to the diffusion-bonding of N-type PbTe and P-type PbTe. This process comprises the inter-diffusion of PbTe and Fe(Armco iron) into each other at a temperature below the Fe-PbTe eutectic of 874°C. (See also PB-163 513)

PB-163 515
TYCO Labs., Inc., Waltham, Mass.
POWER DENSE THERMOELECTRIC MODULE. Monthly letter-type progress rept. no. 9 and 10, 9 Jan-8 Mar 62
A. I. Mlavsky. 15 May 62, 4p
Contract NObs-86015
OTS $1.10

DESCRIPTORS: *Semiconductor devices, *Thermoelectricity, *Bonding, *Iron, *Lead compounds, *Tin compounds, *Tellurides, Thermal stresses, Thermocouples, *Modules (Electronic)

This report describes the work thus far completed on the design, fabrication and evaluation of PbTe thermocouples. Bonding procedures have been altered slightly, from those used for individual thermoelements, in order to conform more closely to thermocouple fabrication. (See also PB-163 514)

N64-15862
Union Carbide Consumer Products Co., Parma, Ohio.
STUDY PROGRAM TO IMPROVE FUEL CELL PERFORMANCE BY PULSING TECHNIQUES. Quarterly rept. no. 2, 1 Oct-31 Dec 63
M. L. Kronenberg. 2 Jan 64, 20p
Contract NAS3-2752
NASA CR-55742
OTS $1.60

AD-401 770
Vidya Div., Itek Corp., Palo Alto, Calif.
STUDY OF ELECTRICAL BREAKDOWN CONDITIONS IN THE AERODYNAMIC FLOW FIELD OF A HYPERSONIC VEHICLE. Final rept., 1 Aug 61-31 Jul 62, on Microwaves in Hot Gases, and Proj. Defender
Morton Rudin, Boris Ragent, and Charles E. Noble, Jr.
30 Jan 63, 176p
Contract Nonr-3581(00)
Rept. no. 63-94; ARPA Order no. 207-62; N63-14637
OTS $12.50

DESCRIPTORS: *Guided missile antennas, *Satellite antennas, *Reentry vehicles, *Antennas, Gas ionization, Electric fields, Gas flow, Hypersonic characteristics, Mathematical analysis, Electric discharges, *Antenna radiation patterns, Slot antennas, Aerodynamic configurations.

A numerical technique was formulated for solving the antenna breakdown equation in the presence of gaseous flow for typical antenna electric field and aerodynamic flow-field configurations. The results of computations for nonflow conditions agree well with existing data. Breakdown conditions were computed for sample cases of antenna type, vehicle shape, and velocity-altitude combinations. The results in air show that once ambipolar diffusion has been established increasing the vehicle velocity at a fixed altitude usually increases the breakdown field strength. This increase is found to be caused principally by the increase of gas density near the antenna and, to a much lesser degree, by the effect of the boundary-layer flow velocity in sweeping electrons out of the high electric field regions. The kinetic theory concepts involved in the above calculations have been critically examined and the gaseous material properties necessary for these calculations have been estimated. The inviscid and viscous flow fields in which the test antenna is immersed were calculated for wedges and cones, using equilibrium real-gas theory, and the results of these calculations were used as inputs for the previously discussed calculations. (Author)

N64-13916
Westinghouse Electric Corp., Baltimore, Md.
SELF-REPAIR TECHNIQUES FOR FAILURE-FREE SYSTEMS. Special technical rept. no. 2
M. R. Cosgrove and C. G. Masters. Sep 63, 40p
Contract NASw-572
NASA CR-55267
OTS $3.60

N64-14286
Westinghouse Electric Corp., Baltimore, Md.
TRANSOR DECISION FUNCTIONS AND STATISTICAL MEASUREMENT OF QUALITY. Special technical rept. no. 4.
R. S. Bray, P. A. Jensen, and C. G. Masters.
Sep 63, 50p
Contract NASw-572
NASA CR-55307
OTS $4.60

WCAP-1811(Rev.)
Westinghouse Electric Corp., Pittsburgh, Pa.
THERMOELECTRIC HEAT EXCHANGER DEMONSTRATION UNIT. Final rept.
Joseph C. Danko. Jan 62, 22p
Contract AT(30-3)500
OTS $0.50

Ordnance, Missiles, and Satellite Vehicles

N64-15532
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SATELLITE SITUATION REPORT, VOLUME 3 - NUMBER 25.31 Dec 63, 11p
Technical memo X-54539; NASA X-533-63-1
OTS $1.60

N64-15794
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1970, VOLUME 5, PART A
V. C. Clarke, Jr., R. Y. Roth, W. E. Bollman, T. W. Hamilton, and C. G. Pfeiffer. 16 Sep 63, 790p
Contract NAS7-100
Technical memo no. 33-99; NASA CR-53073
OTS $31.00

N64-15795
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1970, VOLUME 5, PART C
V. C. Clarke, R. Y. Roth, W. E. Bollman, T. W. Hamilton, and C. G. Pfeiffer. 15 Oct 63, 790p
Contract NAS7-100
Technical memo no. 33-99; NASA CR-53974
OTS $31.00

N64-15791
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-24, VOLUME VI FOR THE PERIOD 1 SEPTEMBER - 30 NOVEMBER 1963. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES
31 Dec 63, 91p
Contract NAS7-100
NASA CR-53069
OTS $8.60

N64-15792
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-25, VOLUME III FOR THE PERIOD 1 NOVEMBER - 31 DECEMBER 1963. THE DEEP SPACE INSTRUMENTATION FACILITY
31 Jan 64, 66p
Contract NAS7-100
NASA CR-53065
OTS $6.60

N64-15793
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-25, VOLUME VI FOR THE PERIOD 1 NOVEMBER - 31 DECEMBER 1963. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES
31 Jan 64, 65p
Contract NAS7-100
NASA CR-53058
OTS $6.60

N64-14275
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
ATMOSPHERIC ACOUSTICS AS A FACTOR IN SATURN STATIC TESTING
Richard N. Tedrick. 1 Oct 63, 143p
MTP-TEST-63-9; NASA TM-X-51438
OTS $11.00

N63-20193
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
A THEORETICAL INVESTIGATION OF THE EFFECTS OF THE CONFIGURATIVE DESIGN OF A SPACE VEHICLE ON ITS STRUCTURAL BENDING FREQUENCIES AND AERODYNAMIC STABILITY
Nathan L. Beard. 16 Apr 62, 37p
MTP-AERO-62-35; NASA TM-X-50231
OTS $3.60

PB-163 744
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
AN ANALYSIS OF CDA STATION EFFECTIVENESS IN RELATION TO SATELLITE ORBIT
Robert L. Pyle and S. Fred Singer. Jul 63, 32p
Rept. no. 18
OTS $3.60

DESCRIPTORS: *Ground support equipment, *Command and control systems, *Data transmission systems, *Site selection, Satellites (Artificial), Orbital trajectories, Effectiveness.

The "effectiveness" of any geographical location as a site for satellite data acquisition depends significantly on 1) percentage of passes from which data may be acquired, 2) elevation angles to the satellite during acquisition, and 3) length of time available for acquisition during each pass. The geometric relationships are examined analytically to determine the dependence of station "effectiveness" on satellite altitude and orbital inclination. (Author)

N64-15901
Northrop Space Labs., Hawthorne, Calif.
LUNAR LOGISTIC SYSTEM PAYLOAD PERFORMANCE STUDY. VOLUME III: DEVELOPMENT, PROGRAMS, AND ESTIMATED SCHEDULES AND COSTS. Final rept.
Richard E. Horner. Jan 63, 42p
Contract NASw-529
NSL-63-4; NASA CR-55672
OTS $4.60

ORNL-3549
Oak Ridge National Lab., Tenn.
SPACE VEHICLE SHIELDING STUDIES (PART III): THE ATTENUATION OF A PARTICULAR SOLAR FLARE BY AN ALUMINUM SHIELD
R. G. Alsmiller, Jr. and J. E. Murphy. [Feb 64] 6p
Contract W7405-eng-26
OTS $0.50

N64-14155
Rand Corp., Santa Monica, Calif.
OPERATIONS RESEARCH APPLICATIONS IN SUPPORT PLANNING FOR MANNED SPACE FLIGHT
Sidney L. Firstman. Oct 63, 11p
Contract NASr-21(08)
Rept. P-2809; NASA CR-55284
OTS $1.60

Presented at the National Meeting of the Operations Research Society, Seattle Wash., Nov. 1963.

PB-165 217
[Research Analysis Corp., McLean, Va.]
ANALYSIS OF A LIGHT CROSS COUNTRY COMBAT VEHICLE - THE COBRA. Technical memo. on Project ARMOR
James W. Johnson, Martin Grabau, M. G. Bekker, Wiley P. Montgomery, and William G. Simpson.
1 Jun 51, 335p
[Contract DA44-109-qm-266]
ORO-T-119; ATI-149 375
OTS $19.75

DESCRIPTORS: *Armored vehicles, *Tracked vehicles, *Self-propelled guns, *Rocket launchers, *Cargo vehicles, Passenger vehicles.

An analysis was made of the principal factors of mobility, firepower, protection, economy of operation, and cost. A number of specific disigns for vehicles were made to assist in the analysis, to test, at least tentatively, the considerations of technical feasibility, and to aid the Army in its selection. The solutions to obtain superior mobility and firepower may be considered somewhat unconventional. (Author)

SCTM-93-62(14)
Sandia Corp., Albuquerque, N. Mex.
REDUCTION OF HUMAN ERROR IN INDUSTRIAL PRODUCTION
L. W. Rook, Jr. Jun 62, 24p
Contract AT(29-1)789
OTS $2.60

PB-165 257
Massachusetts Inst. of Tech., Cambridge.
PROCUREMENT OF SERVICES PERTINENT TO THE DETERMINATION OF BACTERIAL RESISTANCE OF PACKAGES. Rept. no. 9(Final), 26 Sep 56-25 Mar 58, on Investigation of Bacterial Resistance of Packages
B. E. Proctor and J. T. R. Nickerson. [1958] 37p
Contract DA19-129-qm-758
QMFCIAF File no. S-561
OTS $3.60

DESCRIPTORS: *Containers, *Bags (Containers), *Bacteria, Penetration, *Plastic films, Foils, Radiation effects, Aluminum, Statistical data.

An investigation was made of the frequency of penetration by S. marcescens, R. rubra, E. coli, Cl. sporogenes, M. purpurens and F. culmorum of flat sheets of a wide variety of flexible food packaging materials (plain, creased, and heat sealed) and of heat sealed four-inch bags prepared from the same materials. In general, it was found that plain films, except those of small gages (0.5 mil or less), showed no penetration by microorganisms. All plain aluminum foils showed microbial penetration. Creasing tended to increase the penetration of many of the films tested. Heat sealing did not increase the penetration of most films. Irradiation did not affect the frequency of penetration of most films tested. (Author)

Food

PB-163 602
American Can Co., Barrington, Ill.
COMPARATIVE RESISTANCE OF SELECTED STRAINS OF Cl. BOTULINUM IN SELECTED FOOD PRODUCTS. Rept. no. 9(Final), 15 May 58-15 Nov 61
E. Wheaton and G. B. Pratt. Dec 61, 44p
Contract DA19-129-qm-1191
QMFCIAF File no. S-579
OTS $4.60

DESCRIPTORS: *Radiation tolerance, *Food, *Clostridium botulinum, Preservation, *Spores, Bacteria, Survival, Dose rate, Freeze drying,

This report describes the results obtained with 5 foods inoculated with 5 strains of Cl. botulinum. Survival curves of one strain of Cl. botulinum using spore concentrations from 37×10^3 to 64×10^9 per dose are presented with the percent survival. The effect of irradiation variables on spore destruction are described. (Author)

PB-163 558
American Can Co., Barrington, Ill.
RESEARCH STUDY ON CAN ENAMELS AS PART OF THE RADIATION PRESERVATION OF FOODS PROGRAM. Rept. no. 11(Final), 29 May 57-29 May 60
G. B. Pratt. 29 May 60, 107p
Contract DA19-129-qm-968
QMFCIAF File no. S-567
OTS $9.10

DESCRIPTORS: Food, *Radiation effects, *Containers, *Plastic coatings, Storage, Heat treatment, Public health, Preservation.

The experiments were designed to determine the types of interior can enamels suitable for foods to be processed with ionizing radiation. The experiments were also designed to determine if the effects of radiation and subsequent storage on the can enamel differ from the effects of heat processing and subsequent storage with respect to performance and safety to public health. One or more satisfactory can enamels were found for each of the representative irradiated products in the experiment. No evidence was discovered to indicate that any hazard to the public health will be introduced by irradiated can enamels. (Author)

PB-163 601
American Meat Inst. Foundation, Chicago, Ill.
A STUDY OF MEAT ENZYMES TO DETERMINE MEANS FOR THEIR CONTROL. Rept. no. 14(Final), 3 Jun 58-15 Sep 61
W. A. Landmann, R. S. Sliwinski, Renee Margolis, Katherine Pih, and Mary Kliauga. 15 Oct 61, 50p
Contract DA19-129-qm-1204
QMFCIAC File no. S-582
OTS $4.60

DESCRIPTORS: *Meat, *Enzymes, Food, *Peptide hydrolases, Proteins, *Biological assay, Purification, Radiation effects, Heat, Ethylenedinitrilo tetracetates

Methods for purification and assay of meat proteases were developed. Enzymes found resembled spleen cathepsins B & C. Systems activated by Fe^{++}, inhibited by EDTA, inactivated by heating to 140°F or more. (Author)
(Food, 20 May 64)

PB-163 551
California Univ., Davis.
MICRO-WAVE SPECTRA AND PHYSICAL CHARACTERISTICS OF FRUIT AND ANIMAL PRODUCTS RELATIVE TO FREEZE-DEHYDRATION. Rept. no. 6 (Final), 15 Jan 59-14 Jul 60
J. C. Harper and C. O. Chichester. 14 Jul 60, 30p
Contract DA19-129-qm-1349
QMFCIAF File no. F-306
OTS $2.60

DESCRIPTORS: *Microwave spectroscopy, *Fruits, Food, *Meat, *Freeze drying, Dielectric properties, Premeability, Thermal conductivity,

Theory relevant to permeabilities, diffusivities, and thermal conductivities in gas-filled porous solids are discussed and experimental results reported for various gases in several freeze-dried foods. It was found that freeze-dryer operating pressures usually correspond to the transition between slip and free-molecule flow. Dielectric constants and loss factors are reported for several frozen foods for frequencies from 500 to 2000 mc. and temperatures from 5 to 25°F. Loss factors are somewhat higher at lower frequencies and substantially higher at higher temperatures. (Author)

PB-163 599
Continental Can Co., Inc., Chicago, Ill.
COMPARATIVE RESISTANCE OF STRAINS OF CLOSTRIDIUM BOTULINUM TO IONIZING RADIATION. Rept. no. 11 (Final), 11 Jun 58-10 Dec 61
J. M. Heinen, J. F. Folinazzo, R. V. Lechowich, W. K. Nak, and C. F. Schmidt. [1961] 132p
Contract DA19-129-qm-1214
QMFCIAF File no. S-576
OTS $10.50

DESCRIPTORS: *Radiation tolerance, *Food, *Clostridium botulinum, *Spores, Ionization, Meat, Vegetables, Preservation, Decontamination,

The radiation resistances of spores of four types of Cl. botulinum (6A, 5B, 2C & 6E) were determined in a half stew substrate. Results showed that any radiation sterilization dose based upon the maximum resistance among Type A strains (max. D-value = 0.31 Mr.) should be adequate for all four toxin types. (Author)

PB-163 546
Denison Research Foundation, Powell, Ohio.
COMPRESSION OF DEHYDRATED FOOD PRODUCTS. Rept. no. 5(Final), 15 Jun 60-14 Jun 61
Makhtar M. Hamdy, Barney E. Whetsel, Joseph F. Lovering, Paul W. Tesnow, and William B. McBride. [1961] 75p
Contract DA19-129-qm-1630
QMFCIAF File no. V-339
OTS $7.60

DESCRIPTORS: *Dehydrated foods, *Vegetables, *Fruits, *Meat, Material forming, Hydraulic presses, Moisture.

Fruits yielded to compression better than vegetables which varied from "impractical for compression" to "satisfactorily compressed." Moisture content in the dehydrated product was also recognized as the most critical factor in compression. Heat conditioning and long dwell periods contributed to more cohesive blocks and higher compression ratios. Conditioning temperatures from 120°F. to 180°F. did not affect the quality of the compressed products; moreover, fragmentation was decreased, especially in vegetables. Style of product and size and weights of blocks affected the compressibility of dehydrated foods. (Author)

PB-163 563
Florida State Univ., Tallahassee.
DEVELOPMENT OF A STABLE CURED PORK PRODUCT. Rept. no. 8(Final), 1 Oct 56-30 Sep 58
Betty M. Watts [1958] 29p
Contract DA19-129-qm-75
QMFCIAF File no. S-535; AD-217 344
OTS $2.60

DESCRIPTORS: *Pork, Processing, Storage, *Radiation effects, Taste, Odors, *Preservation, Dose rate.

Ground pork with curing salts and various other additives was packed in cans, heated to an internal temperature of 70°C., irradiated at a dose of 2×10^6 rads gamma rays and stored at room temperature. Nitrite recovery, pigment changes, TBA, drip, -SH groups and odor acceptance have been measured. Concentration of curing salts, time of heat processing, effect of ascorbate and smoke reduction of headspace oxygen were investigated. (Author)

PB-163 553
Georgia Experiment Station, Experiment.
LONG-TERM STORAGE OF OPERATIONAL RATIONS. Rept. no. 10(Final), 28 Nov 58-27 Nov 61
J. G. Woodroof. [1961] 12p
Contract DA19-129-qm-1342
QMFCIAF File no. R-301
OTS $1.60

DESCRIPTORS: *Military rations, *Storage, Food, Preservation.

PB-163 544
Hormel Inst., Univ. of Minnesota, Austin.
FACTORS CONTROLLING RANCIDITY DEVELOPMENT IN FREEZE DRIED MEATS. Rept. no. 4(Final) 15 Dec 50-14 Dec 61
J. R. Chipault, John M. Hawkins, and Evelyn McMeans [1961] 36p
Contract DA19-129-qm-1725
QMFCIAF File no. A-339
OTS $3.60

DESCRIPTORS: *Meat, *Freeze drying, *Rancidity, Oxidation, Odors.

The oxidative deterioration of freeze dried beef and chicken was studied by measuring oxygen absorption and peroxide accumulation by samples of whole tissues and by isolated lipid and non lipid components. Two types of oxidation are evident. One involves the rapid non autocatalytic oxidation of bound lipids of the tissue which may be accompanied by the formation of stale, slightly putrid odors. The other involves the oxidation of the neutral fat by the familiar autocatalytic free radical chain mechanism and results in the formation of typical rancid odors. (Author)

PB-163 545
Little (Arthur D.) Inc., Cambridge, Mass.
STABILIZATION OF LEAVENING SYSTEMS IN INSTANT BREAD MIX. Rept. no. 5(Final), 4 Nov 60-3 Nov 61
Robert F. Larsen. [1961] 41p
Contract DA19-129-qm-1710
QMFCIAF File no. C-323
OTS $4.60

DESCRIPTORS: *Bread, *Military rations, *Sodium compounds, *Carbonates, Storage, Preservation, *Dehydrated foods.

The following topics are included: study of the behavior of pure sodium bicarbonate and of the complete bicarbonate-glucono-delta-lactone leavening system under various conditions; study of the reduction of decomposition of the sodium bicarbonate by coating it with 26% melted vegetable shortening; the use of shortening-coated bicarbonate in the QM Instant Bread Mix; various Instant Bread Mix formulations aimed at producing a more stable Mix; results of aging tests on the above Mixes; a recommended formulation for Instant Bread Mix, containing both the bicarbonate and the glucono-delta-lactone coated with shortening; production of large quantities of the stabilized leavening system; recommendations for use of the coated materials to prepare 200 pounds of instant Bread Mix. (Author)

PB-163 562
Long Island Vegetable Research Farm, Cornell Univ., Riverhead, N. Y.
PHYSIOLOGICAL EFFECTS OF IONIZING RADIATION ON ONIONS AND POTATOES. Rept. no. 4(Final), 20 Sep 56-19 Jan 59
Stewart Dallyn and Richard L. Sawyer. [1959] 82p
Contract DA19-129-qm-755
QMFCIAF File no. S-555
OTS $8.10

DESCRIPTORS: *Radiation effects, Ionization, *Vegetables, *Potatoes, Storage, Preservation.

Commercial control of sprouting can be obtained with most potato varieties for long term holding at dosages of 7500 to 12,500r depending on the variety. Storage rots can be increased due to irradiation. A small increase was encountered one year at the levels necessary for sprout control. Black spot of potatoes was increased due to irradiation. The dosage necessary for sprout control and the level which increases black spot overlap with most varieties. Irradiation increased the incidence of after cooking darkening of potatoes. This increase was obtained with most varieties at the levels necessary for commercial sprout control. Irradiation at 12,500r caused a small reduction in normal wound periderm formation. The ascorbic acid content of potatoes decreased as the level of irradiation increased. The discoloration of peeled potatoes with all varieties tested was increased by irradiation. (Author)

PB-163 561
Massachusetts Univ., Amherst.
ENZYMOLOGY OF FRUITS AND VEGETABLES SUBJECTED TO PASTEURIZING AND STERILIZING LEVELS OF IONIZING RADIATIONS. Rept. no. 11 (Final), 12 Dec 56-30 Nov 58
William B. Esselen, Ward M. Hunting, Marcel Gagnon, and Mohamed Zoueil. 30 Apr 59, 81p
Contract DA19-129-qm-815
QMFCIAF File no. S-563
OTS $8.10

DESCRIPTORS: Food, *Fruits, *Vegetables, *Preservation, Radiation effects, *Enzymes, *Catalase, *Peroxidase, Inhibition.

New methods were developed for assay of peroxidase and catalase activity. Peroxidase and catalase activity in a large number of raw vegetable and fruit products are reported. Activity of peroxidase in peas, green beans, carrots, and broccoli is reported for various combinations of treatment by blanching and/or irradiation. Blanching times from 0-10 minutes over temperature ranges from 164° to 212°F. (73°-100°C.) were used. Irradiation levels from 0.5 to 6.7 megarads, with special runs up to 20 megarads were employed. Non-logarithmic destruction rate curves for enzyme inactivation were shown. Interference from ascorbic acid and iron are evaluated. No major interaction was found between blanching and irradiation. (Author)

PB-163 566
National Canners Association, Washington, D. C.
STUDY OF THE DESTRUCTION OF FOOD POISONING ORGANISMS IN CANNED FOODS SUBJECTED TO IONIZING RADIATION. Rept. no. 22(Final), 10 Jun 55-31 Mar 60
C. A. Greenleaf. 31 Mar 60, 38p
Contract DA19-129-qm-445
QMFCIAF File no. S-536; AD-243 384
OTS $3.60

DESCRIPTORS: *Food, *Preservation, Deterioration, *Clostridium botulinium, *Radiation effects, Storage, Viability, Dose rate, Spores, Gamma rays, Containers.

The gamma radiation resistance of Clostridium botulinum Type A and Type B strains has been determined in whole kernel corn, chicken soup, and beef at room temperature; in peas, chicken soup, and pork at freezing temperature; and in neutral phosphate at both temperatures. The resistance was determined by spoilage endpoint (following 1 year of incubation), survivor curve data, and partial spoilage D values. Viable spores were isolated from occasional flat cans but in no case was toxin encountered in any flat cans. Spores of Clostridium botulinum were destroyed more easily when irradiated at room temperature than at freezing temperature. The significance of the results in relation to the establishment of a minimum sterilizing dose of irradiation providing public health safety is discussed. (Author)

PB-163 564
Nuclear Science and Engineering Corp., Pittsburgh, Pa.
DETERMINATION OF NEUTRON DOSAGES BY FOOD IRRADIATION DEVICES. Rept. no. 12(Final), 10 Sep 56-9 May 60, on Study to Determine Neutron Fluxes in Food Irradiation Facilities
P. Kruger and C. R. Wilson. [1960] 122p
Contract DA19-129-qm-741
QMFCIAF File no. S-549; AD-245 080
OTS $10.10
DESCRIPTORS: Food, *Radiological dosage, *Neutrons, Neutron flux, Meat, Chickens, Dosimeters.

A program was completed in which the neutron fluxes present in food irradiation facilities of interest to the QMFCI and the induced activity generated in the food irradiated at these facilities have been measured. For spent fuel element facilities, the thermal neutron fluxes ranged from 7 to 18,000 n/cm^{2}sec, the epithermal neutron fluxes from 0.5 to 200 n/cm^{2}sec ev, and the fast neutron fluxes from <170 to 6,650 n/cm^{2}sec for energies above 2.5 Mev, from <50 to 1,100 n/cm^{2}sec for energies above 2.8 Mev, and <80 n.cm^{2}sec for energies above 8.1 Mev. For linear accelerators, the corresponding values are given as a function of electron energy. For the machines ranging from 2 to 8 Mev, the thermal fluxes ranged from <2 to 320 n/cm^{2}sec, the epithermal fluxes from 0.1 to 3.2 n/cm^{2}sec ev, and the fast fluxes were less than 2 x 10^4 for all energies. For the high energy machines ranging from 15 to 35 Mev, the thermal fluxes ranged from 1.6 x 10^3 to 1.5 x 10^5 n/cm^{2}sec, the epithermal fluxes from 14 to 670 n/cm^{2}sec, ev, and the fast fluxes from <5 x 10^3 to 3 x 10^5 n/cm^{2}sec above 2.5 Mev to <1.6 x 10^4 to 3 x 10^4 n/cm^{2}sec above 11.5 Mev. (Author)

PB-163 556
Oregon State [Univ.] Corvallis. Agricultural Experiment Station.
STUDY AND INVESTIGATION OF RADIATION RESISTANT ORGANISMS IN FOOD. Rept. no. 11 (Final), 1 Nov 57-1 Jan 60
A. W. Anderson, P. R. Elliker, and R. F. Cain. [1960] 40p
Contract DA19-129-qm-1055
QMFCIAF File no. S-547; AD-243 388
OTS $3.60

DESCRIPTORS: *Radiation tolerance, Food, *Meat, Microorganisms, Gamma rays, *Radiation effects, Bacteria, Heating, Preservation, Survival, Antibiotics,

Survival curves using gamma radiation as the sterilizing agent were determined in raw beef using four strains of Micrococcus radiodurans (R_1) and one culture of Bacterium radiodurans (M_1R). Bacterium radiodurans a gram positive rod was as resistant as R_1, the most resistant strain of Micrococcus radiodurans (M_1R). Survival curves of the R_1 strain in other menstrua showed that resistance was significantly greater in raw beef and chicken than in raw fish and in cooked beef. Its resistance was lowest in buffer.. Cells grown in broth (an artificial growth medium) and resuspended in beef did not differ in resistance from cells that had been grown in the beef and then irradiated. (Author)
(See also AD-235 512)

PB-163 557
Psychometric Lab., Univ. of North Carolina, Chapel Hill.
PREFERENCE FOR FOOD COMBINATIONS. Rept. no. 5(Final), 1 Oct 57-31 Jan 59
Lyle V. Jones, R. Darrell Bock, Emir H. Shuford, and Edward S. Johnson. [1959] 32p
Contract DA19-129-qm-1045
QMFCIAF File no. P-1113; AD-233 087
OTS $3.60

DESCRIPTORS: Food, Acceptability, Military personnel, *Attitudes, *Psychometrics, Mathematical models, Statistical analysis.

A model is proposed for predicting preference for menus consisting of 3 foods. Ratings of pairs of foods from each menu were required to estimate effects of interactions of preference. Also, a new paired comparisons method, was developed for the measurement of subjective values of objects with respect to a rational origin. The power of a model for the prediction of choice of simple menus consisting of three food items was evaluated in a field trial with 307 Army enlisted personnel. Preference data for the individual constituent items predicted 82.01% of the variance in the preference scale values of the menus. Inclusion of preference data for pairs of constituents added a statistically significant 13.96%, or a total of 95.97%, of variance to prediction. The results are interpreted as: (1) confirming the value of preference data for individual foods in predicting the acceptability of meals; (2) establishing the existence of interactive effects in preference for food combinations; and (3) demonstrating the predictive value of preference data for pairs of foods in predicting the acceptability of meals. Use of the model in optimizing institutional menus is suggested. (Author)

PB-163 550
Swift and Co., Chicago, Ill.
COOKED, FABRICATED, FREEZE-DRIED STEAK.
Rept. no. 4 (Final), 23 Oct 59-22 Oct 60
H. L. Roschen. 17 Nov 60, 23p
Contract DA19-129-qm-1495
QMFCIAF File no. A-336; AD-250 385
OTS $2.60

DESCRIPTORS: *Beef, Processing, Preservation, *Freeze drying, *Dehydrated foods, Preparation, Acceptability, Meat, Storage, Food.

Steaks were prepared by separating from boneless chuck meat the lean connective tissue free muscle, and then slicing this on a potato chip slicer. Remaining chuck meat was flaked on an Urschel flaker. Slices and flaked meats were mixed, formed into logs and frozen. Steaks were cut from the frozen logs, cubed, cooked and then freeze dried. Drying time for this product was reduced to 5-7 hr in metal contact or sandwich drying and to 7 to 9 hr in radiant heat drying by employing elevated drying shelf temperatures and by modifications in heat radiating and absorbing surfaces. Keeping quality tests gave preliminary indication that the product was satisfactory. Tests, however are not finalized. (Author)

PB-163 549
Swift and Co., Chicago, Ill.
DEVELOPMENT OF READY-TO-EAT RATION-TYPE BEEF ITEMS. Rept. no. 6 (Final), 8 Jan 60-24 Sep 61
F. L. Kauffman, W. R. Schack, and D. D. Duxbury. [1961] 15p
Contract DA19-129-qm-1533
QMFCIAF File no. S-601
OTS $1.60

DESCRIPTORS: *Beef, *Meat, *Radiation effects, *Taste, Military rations, Condiments.

Irradiation at - 196°C resulted in product that had very little detectable irradiation flavor. Beef steaks were comparable flavor-wise to unirradiated controls to most tasters. Various additives were found to reduce the irradiation flavor. Barbecue sauce with sliced roast beef was the most effective of those tried. The use of a mixture of ascorbic acid, sodium nitrite, sodium chloride, fresh onion, pepper and tomato paste in ground beef resulted in a product that had considerably less irradiation flavor than 100% beef. A gravy prepared with a protein hydrolysate also reduced irradiation flavor. The addition of fat to ground beef reduced the amount of irradiation flavor detected. Italian meatballs with tomato sauce had very little irradiation flavor. (Author)

PB-163 565
Syracuse Univ. Research Inst., N. Y.
THE CHEMICAL ENHANCEMENT OF BACTERIAL RADIO-SENSITIVITY IN THE RADIATION STERILIZATION OF FOODS. Rept. no. 12 (Final), 1 Sep 55-31 Dec 57
A. W. Phillips, H. R. Newcomb, J. H. Wynn, and J. E. Smith
Contract DA19-129-qm-524
QMFCIAF File no. S-546; AD-201 602
OTS $7.60

DESCRIPTORS: *Radiation tolerance, Sensitivity, *Decontamination, *Food, Spores, Bacteria, *Bacillaceae, Bacillus subtilis, Preservation, Synergism,

A number of compounds were found to be synergistic or complementary with x irradiation in the inactivation of spores of Bacillus thermoacidurans, B. subtilis, and B. cereus. A number of compounds were complementary with x irradiation in the inactivation of spores. B. subtilis spores were more radio-resistant than those of B. cereus or B. thermoacidurans; the respective D_0 values were about 150,000, 80,000, and 50,000 rads. Fluid milk and fresh meats were sterilized by combined radiation and dilute ethylene oxide treatment using 100,000 rads or less of ionizing radiation. While the sterilized foods were normal in appearance and taste, no attempt was made to determine their wholesomeness. The main objective of this phase was the establishment of a bacteriological baseline; the selection of the most appropriate agent will require further investigation. Propylene oxide should be explored since it too is volatile and its glycol is metabolizable and harmless, whereas ethylene glycol is toxic. The need for additional knowledge concerning factors involved in the radiation sensitivity of micro-organisms has been evident throughout this investigation. (Author)

PB-163 570
Takamine Lab., Clifton, N. J.
GLUCOSE OXIDASE CATALASE ENZYME SYSTEM TO PREVENT OXIDATIVE DETERIORATION OF FOODS. Rept. no. 15 (Final), 15 Jun 56-14 Feb 60
L. A. Underkofler. 14 Feb 60, 6p
QMFCIAF File no. D-321
OTS $1.10

DESCRIPTORS: *Antioxidants, *Oxidoreductases, *Catalase, *Containers, Enzymes, Food, Degradation, Oxidation, Plastic films, *Polyethylene plastics, Preservation.

A suitable material composition for rapid and effective removal of oxygen from closed containers was developed. An investigation of films for oxygen scavenger packets containing the enzyme composition showed 0.5 mil low density polyethylene to be most effective. Only partial success was achieved in developing a packet in which the components were isolated until ready to be used. Limited tests of packets for protecting dehydrated food products from deterioration were entirely inconclusive. Poor liaison and control resulted in the use of packets which had lost liquid, and the use of containers containing more oxygen than the capacity of the packets to pick up. (Author)

PB-163 568
Texas Univ., Austin.
STUDY ON COOKING MEAT IN QUANTITY. Rept. no. 16 (Final), 15 Sep 55-15 Mar 58
Rosalie S. Godfrey and Johanna Olander. [1958] 237p
Contract DA19-129-qm-433
QMFCIAF File no. EC-100
OTS $15.50

DESCRIPTORS: *Meat, Cooking devices, Food.

A study was made (1) to determine the effect of oven temperature and oven load on cooking time and cooking losses when certain institutional-sized frozen, boneless, fabricated beef cuts, frozen pork loins and frozen cured hams were cooked in quantity at various oven temperatures to various stages of doneness; (2) to develop optimum methods for cooking Swiss steak in quantity using frozen, partially thawed, and thawed meat; and (3) to develop optimum methods for griddle broiling steaks (in quantity) rare, medium and well done, using frozen, partially thawed, and thawed grill steaks. (Author)

PB-163 569
Veterans Administration, Chicago, Ill.
DIGESTIBILITY OF DEHYDRATED FOODS.
Rept. no. 1 (Final), 1 Jan 58-31 Jul 59
Roy J. Korn. [1959] 15p
QMFCIAF File no. N-1128
OTS $1.60

DESCRIPTORS: *Dehydrated foods, *Diet, Gastrointestinal system, Absorption (Biological).

An evaluation was made of the digestibility and absorption of dehydrated food products and their effect on gastrointestinal motility and function. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

PB-165 204
Materials Advisory Board, NAS-NRC, Washington, D. C.
AEROSPACE MANUFACTURING TECHNIQUES PANEL OF THE COMMITTEE ON THE DEVELOPMENT OF MANUFACTURING PROCESSES FOR AIRCRAFT MATERIALS. Rept. no. 2, 15 Oct 63, 405p
Contract SD-118
Rept. no. MAB-139-M(AMT-2)
Available free from MAB-NAS-NRC, Washington, D. C.

DESCRIPTORS: *Manufacturing methods, *Aircraft materials, *Air Force equipment, Specifications, Standardization, Military requirements.

This report consists of recommended applied research and development programs in each of the following major manufacturing areas; Materials Forming, joining and mechanical fastening, materials treatment, surface conditioning and treatment, electrical & electronic component fabricating techniques, nonmetallic fabrication, and inspection & evaluation techniques (Nondestructive Testing). The term "recommended research and development programs" as used throughout this report, refers to applied, not basic, research, However, in some manufacturing areas the need for basic research is indicated. (Author)

OTS SB-410, Suppl. 1
Office of Technical Services, Dept. of Commerce, Washington, D. C.
BEARINGS. Sep 63, 17p
OTS Selective Bibliography SB-410, suppl. 1
OTS $0.10

DESCRIPTORS: *Bibliographies, *Bearings, Gas bearings, Plastics, Ceramic materials, Journal bearings, Roller bearings,

Lists 234 domestic and foreign references on bearings added to the OTS collection from 1960 through September 1963. Covers research on gas-lubricated bearings; plastic bearings; ceramic bearings; ball bearings; journal bearings; roller bearings; anti-friction bearings; and government-owned patents on bearings.

Engines and Propulsion Systems

BAW-1164(Vol. III)
Babcock and Wilcox Co., Lynchburg, Va.
NUCLEAR MERCHANT SHIP REACTOR. VOLUME III. DEVELOPMENT OF THE NS SAVANNAH OPERATING MANUAL.
Final Safeguards rept.
J. H. MacMillan, ed. Jul 60, 64p
Contract AT(30-3)274
OTS $6.60

NAS-NRC-1132
Building Research Advisory Board, NAS-NRC, Washington, D. C.
DIESEL ENGINES FOR USE WITH GENERATORS TO SUPPLY EMERGENCY AND SHORT-TERM ELECTRIC POWER. 1963, 38p
Contract CST 690
Federal Construction Council Technical rept. no. 46
NAS-NRC $2.00

DESCRIPTORS: *Diesel engines, Generators, Power equipment, *Electric power production, Engine starters, Engine fuel systems components, Engine air systems components, Cooling, Speed regulators, Maintenance, Specifications.

The efficient generation of adequate electric power in emergencies and other short-term situations requiring extraordinary power sources is making steadily increasing demands in both private and public areas--e.g. office building, hospitals, protective shelters, utilities plants, aviation beacons, and a variety of military activities and installations. In the face of these critical requirements, there is a serious lack of understanding and agreement, within government and industry, on criteria for selection of engines to drive electric power generators in situations in which the prime power source must be supplemented or temporarily replaced. Enormous progress has been made in the manufacture of diesel engines, and in the improvement of their quality through research and development. This report presents the important characteristics of diesel engines, practical criteria for selection, and application of such engines to meet a variety of special power requirements. (Author)

GEMP-215
General Electric Co., Cincinnati, Ohio.
630A MARITIME NUCLEAR STEAM GENERATOR.
Progress rept. no. 5.
28 Jun 63, 149p
Contract AT(40-1)2847
OTS $11.00

DESCRIPTORS: *Nuclear propulsion, *Chromium alloys, *Nickel alloys, Creep.

PB-165 251
Jet Propulsion [Center] Purdue Univ., Lafayette, Ind.
EXPERIMENTAL ROCKET MOTOR PERFORMANCE WITH WHITE FUMING NITRIC ACID AND JP-3 AT 500 PSIA COMBUSTION PRESSURE. Interim rept. no. 1, on Proj. Squid
Clair M. Beighley. Apr 52, 46p
Contracts N7onr-39418 and N6ori-104, T.O. 1
Rept. no. I-52-1; ATI-155 747
OTS $4.60

DESCRIPTORS: *Captive tests, *Rocket motors, *Nitric acid, Liquid rocket fuels, Fuel injection, Cooling, Combustion, Heat transfer, Rocket oxidizers, Liquid rocket propellants,

The experimental performance and heat transfer rates were determined, at mixture ratios (oxydizer/fuel by weight) ranging from 3 to 6. for a 500 lb thrust water-cooled rocket motor operating at 500 psia combustion pressure. The maximum specific impulse, corrected for heat transferred to the cooling water, was 235 sec at a mixture ratio of 4.5 to 1. The maximum values of heat fluxe were obtained at a mixture ratio of 5.2 to 1 as follows: 4.0 Btu/in^2-sec for the exhaust nozzle; 2.2 Btu/in^2-sec for the thrust cylinder; and 2.7 Btu/in^2-sec. average overall for the complete rocket motor. A turbulence ring was employed in conjunction with a triplet type injector and gave improved performance, increased heat transfer, and smoother operation. (Author)

Transport, Traction and Hoist Facilities

PB-165 213
[Research Analysis Corp., McLean, Va.]
ANALYSIS OF MEANS FOR MOVING LOGISTIC CARGO FROM SHIP TO SHORE. Technical memo.
William H. Sutherland, Betty W. Holz, William C. Kelly, Patrick M. Dowling, and Morgan Sibbett.
Nov 57, 156p
[Contract DA44-109-qm-266]
ORO-T-361; AD-118 508
OTS $11.50

DESCRIPTORS: *Armed forces transportation, *Logistics, *Amphibious operations, *Cargo, Handling, *Naval vessels (Support), Beaches, *War potential, Analysis,

The choice of means for moving cargo from ship to shore is discussed in terms of the job to be done and the characteristics of the means available. Factors included in the job to be done are the military situation, the nature of the terrain, the weather, the nature of the cargo and of the ship, and the number and type of people who can be made available. The characteristics of the means available include the size, speed, cost, and physical nature of the means, and, most important, the relation of these characteristics to the job to be done. This memorandum is confined to operations in which the shore is in friendly hands. (Author)

AD-264 954
[Research Analysis Corp., McLean, Va.]
COMPUTER-ASSISTED PREPARATION OF TRANSPORTATION ANNEX PLANNER MANUAL. Technical paper Ralph A. Hafner. Aug 61, 177p
[Contract DA44-109-qm-266]
ORO-TP-45
OTS $12.50

DESCRIPTORS: *Transportation, *Logistics, *Instruction manuals, Preparation, Computers, Operations research, Armed forces operations, *Programming (Computers).

The purpose of this document is to exhibit the step-by-step procedure used by the Transportation Corps planner in preparing the Transportation Annex to the Department of the Army Strategic Logistics Study with the assistance of a computer. The main conclusion of the ORO study reported in ORO-T-393 was that the transportation planning procedure could be separated into computational and non-computational elements and sequenced effectively between these elements. The so-called "non-computational" elements are resolved by the planner and this paper is confined to this area. (Author)

MATERIALS

AD-422 700
Chemical and Metallurgical Research, Inc., Chattanooga, Tenn.
DIRECTORY OF GRAPHITE AVAILABILITY. Technical documentary rept.
Julian Glasser and William E. Few. Sep 63, 273p
Contract AF33(616)6288
ASD-TDR-63-853; N64-11766
OTS $4.00

DESCRIPTORS: *Graphite, *Directories, Indexes.

The directory was prepared for the purpose of assisting development, application, and design engineers in the rapid identification of graphite materials and sources of supply. This is the first attempt to prepare a directory of this nature and it is expected that continuing revisions, supplements, or new editions will be needed. A total of 207 graphite products, available from 18 suppliers, are characterized by type, manufacturing methods, analyses, and properties. For each of these products, supplier's availability on grades, sizes and shapes, price, rate or capacity of production, and delivery times are shown. An indexing system allows for the convenient finding of information on suppliers, sizes and shapes, unique characteristics, compositions, and properties. (Author)

UCRL-7426
Lawrence Radiation Lab., Univ. of California, Livermore.
SOME OBSERVATIONS ON THE CREEP OF SPONGE SILICONE RUBBER
Robert J. Jackson. 9 Jul 63, 8p
Contract W7405-eng-48
CONF-102-2
OTS $1.10

ASME Meeting, Philadelphia, Nov 63

DESCRIPTORS: *Foam rubber.

AD-426 292
Naval Ordnance Lab., White Oak, Md.
GLASS FIBER SURFACE TREATMENTS: THEORIES AND NAVY RESEARCH
Porter W. Erickson. 19 Nov 63, 26p
Rept. no. NOLTR 63-253
OTS $0.75

DESCRIPTORS: *Composite materials, *Laminated plastics, *Filiment wound construction, Reinforcing materials, *Glass textiles, *Bonding, *Finishes and finishing, Theory, Naval research.

This report reviews and discusses the current status of both old and new theories to explain the mechanism of finishes at the glass-resin interface in reinforced plastics. All the evidence for and against the Chemical Bonding Theory is cited and examined in view of the fact that this is still the only theory which predicts chemical finish structures which lead to improved laminate strengths. The two events in 1963 which should greatly speed up a solution to the interface problem are discussed. The first is the formation of the "Ad hoc Committee on the Interface Problem in Fibrous Composites" by the Materials Advisory Board. The second is the two-day Navy sponsored meeting on the interface at the Naval Research Laboratories. The expected impact of these events on accelerating fundamental approaches to bear on the problem is discussed. Both recent and current studies by Navy laboratories and contractors to the Navy which are concerned with the resin-glass bond and stronger reinforced plastics are cited and briefly reviewed. (Author)

OTS SB-527
Office of Technical Services, Dept. of Commerce, Washington, D. C.
FILAMENT WOUND CONSTRUCTION. Nov 63, 14p
OTS Selective Bibliography SB-527
OTS $0.10

DESCRIPTORS: *Composite materials, *Filament wound construction, Magnetic materials, Glass textiles, Reinforcing materials, Wire, Epoxy plastics, Steel, Laminated plastics, Laminated glass.

Lists 115 references on filament wound construction added to the OTS collection up to January1964. Covers research on magnetic materials; glass textiles (fibers); reinforced plastics; high strength wire; epoxy resins; ultra-high strength steels; plastic composites; fiberglass laminates; laminated glass; high strength preimpregnated materials; and filament winding.

OTS SB-411, Suppl. 1
Office of Technical Services, Dept. of Commerce, Washington, D. C.
MATERIALS TESTING (INCLUDES NON-DESTRUCTIVE TESTING). Nov 63, 23p
OTS Selective Bibliography SB-411, suppl. 1
OTS $0.10

DESCRIPTORS: *Bibliographies, Materials, *Test methods, *Non-destructive testing, Test equipment, Impact shock, Ultrasonic radiation,

Lists 379 domestic foreign references on materials testing added to OTS collection from 1960 through November 1963. Includes research on non-destructive testing; impact testing, shock impact, ultrasonic testing; test equipment; and testing methods.

OTS SB-526
Office of Technical Services, Dept. of Commerce, Washington, D. C.
METAL COMPOSITES. Nov 63, 10p
OTS Selective Bibliography SB-526
OTS $0.10

DESCRIPTORS: *Composite materials, Metals, *Cermets, *Reinforcing materials, *Metallic textiles, Metallic crystals, *Whiskers(Single crystals), Ceramic materials, Glass, Beryllium, Chromium, Magnesium compounds, Porous materials, Refractory materials.

Lists 72 references on metal composites added to the OTS collection through 1963. Includes fiber reinforced metals and whisker reinforced metals; glass-metal composites; metal-ceramic composites for high temperature application; ductile beryllium composites; porous metallic composite material; refactory metal composites; chromium-magnesia Composites; cast cellular materials among other subjects.

AD-421 514
Rock Island Arsenal Lab., Ill.
NATURAL AGING OF PACKAGING BARRIER MATERIALS AT ROCK ISLAND ARSENAL
L. W. Lynch. 26 Jul 63, 31p
Rept. no. 63-2483
OTS $1.00

DESCRIPTORS: *Packing materials, Aging (Materials), Storage, Moistureproofing, Polyvinyl chloride.

The effect of natural aging on the properties of selected barrier materials conforming to Military Specification JAN-P-117, MIL-B-121 and MIL-B-131 has been determined. The materials tested have been in storage for intervals up to nine years at Rock Island Arsenal. The properties are compared with specification requirements and original properties. Certain properties of JAN-P-117, Type II and JAN-P-117, Type 1, Class C were seriously deteriorated within two years. MIL-B-121 and MIL-B-131 materials were not appreciably affected by the storage. Physical properties and water resistance properties were generally not affected, material resistance to moisture vapor and grease were reduced and the seam construction was adversely affected by the long-term storage. (Author)

AD-289 019
Value Engineering Co., Alexandria, Va.
ELECTRODEPOSITION OF EROSION AND OXIDATION RESISTANT COATINGS FOR GRAPHITE. Quarterly progress rept. no. 2, 17 Jul-16 Oct 62
E. Goodman, R. Thompson, and J. Huminik, Jr.
15 Nov 62, 5p
Contract N600(19)58317
OTS $1.10

DESCRIPTORS: *Rocket motor nozzles, *Refractory coatings, *Cermets, *Graphite, Silicon compounds, Carbides, Tantalum compounds, Nitrides, Zirconium compounds, Borides, Molybdenum compounds, Silicides, Chromium compounds, Oxides, Ceramic materials, *Electrodeposition.

The relationship between the quantity of SiC ceramic particles in the plating solution and the quantity which become occluded in the coating was investigated. The effect of coating composition utilizing what was determined to be an optimum coating thickness of 2.5 to 3 mils was investigated. Plating solutions were prepared for depositing SiC, TaC, Si nitride, and Zr boride - 10% Mo Si2, each in a Cr matrix. Twenty-four nozzles were fired in the H2-02 test motor. (Author)

AD-284 617
Vitro Labs., West Orange, N. J.
DEVELOPMENT OF SUBMICRON POWDER MANUFACTURING METHOD. Final technical engineering rept.
J. D. Holmgren, J. O. Gibson, and R. Weidman.
Aug 62, 118p
Contract AF33(600)42916
ASD-TR-62-7-884
OTS $9.60

DESCRIPTORS: *Ceramic materials, *Refractory materials, Powders, *Powder metals, Manufacturing methods, Oxides, Aluminum compounds, Thorium compounds, Molybdenum compounds, Magnesium compounds, Zirconium compounds, Carbides, Niobium compounds, Tungsten compounds, Iron, Niobium, Aluminum, Tungsten, Molybdenum, Titanium

A manufacturing process, utilizing the high intensity arc vaporization techniques, was developed for producing submicron size powders of refractory and non-refractory metals, oxides, and carbides. Powders having average particle sizes less than 1000A degrees (0.1 micron) and purities exceeding 99% were demonstrated as reproducible. Materials which were investigated include silica, alumina, thoria, tungsten oxide, molybdenum oxide, magnesium oxide, zirconium oxide, iron oxide, titanium oxide, columbium oxide, tantalum carbide, tungsten carbide, aluminum metal, titanium metal, columbium metal, tungsten metal and molybdenum metal. Tentative processes have been established on a pilot basis for most of these materials. The processes which were developed are amenable to further scale up and appear to be economically attractive. (Author) (See also AD-273 276)

Ceramics and Refractories

AD-299 300
Coors Porclain Co., Golden, Colo.
LARGE CERAMIC RADOME MANUFACTURE BY DRY-ISOSTATIC PRESSING TECHNIQUES (CERAMIC RADOMES-DRY PRESSING) Final technical documentary rept. for 1 Nov 58-1 Sep 60
Alan Pedigo. 1 Sep 60, 85p
Contract AF33(600)37879
ASD-TDR-62-967
OTS $8.10

DESCRIPTORS: *Radomes, *Aluminum compounds, Encapsulation, Tables, Hydraulic presses, Electrical properties, Mechanical properties, Models, Pressure vessels, Hydrostatic pressure, Sintering, Nondestructive testing, Dyes, Turbulence, Heat transfer, Brazing, Nonlinear differential equations, Trajectories, Thermal stresses, High-temperature research, Erosion, Ceramic coatings, Alloys, Silver solders, Ceramic materials, Oxides,

GEMP-270A
General Electric Co., Cincinnati, Ohio
HIGH-TEMPERATURE MATERIALS AND REACTOR COMPONENT DEVELOPMENT PROGRAMS. VOLUME I MATERIALS. Annual rept. no. 3.
28 Feb 64, 159p
Contract AT(40-1)2847
OTS $2.75

PB-165 205
[IIT Research Inst.] Chicago, Ill.
STUDIES OF THE BRITTLE BEHAVIOR OF CERAMIC MATERIALS Quarterly rept. no. 1, 15 Jan-15 Apr 63
N. M. Parikh and W. Rostoker, ed. 31 May 63, 111p
Contract AF33(657)10697
Rept. no. ARF B6012-1
OTS $9.60

DESCRIPTORS: *Ceramic materials, *Crystals, Brittleness, Stresses, Creep, Friction, Fracture (Mechanics), Impurites, Crystal lattice defects, Porosity.

Contents:
Strain rate effects; effect of nonuniform stress fields; internal friction and creep in polycrystalline ceramics; surface and fracture energy; fracture mechanics; effects of impurities on the properties of ceramics; thermal-mechanical history; dislocation studies in polycrystalline ceramics; crack propagation studies; effect of porosity; effects of polyaxial stresses.

PB-165 203
Materials Advisory Board, NAS-NRC, Washington, D. C.
AD HOC COMMITTEE ON PROCESSING OF CERAMIC MATERIALS 15 Oct 63, 101p
Contract SD-118
Rept. no. MAB-195-M; N63-23552
Available free from MAB-NAS-NRC, Washington 25, D. C.

DESCRIPTORS: *Ceramic materials, *Processing, *Research program administration, Structural properties, Heat treatment, Material forming, Surface properties.

Full utilization of the potential of ceramic materials in defense systems has been retarded both by the lack of basic information and by the lack of reproducibility, reliability, and uniformity which has accompanied transfer from the laboratory to production. These difficulties are attributed to the lag of the science of processing behind the science of ceramic materials. To close this gap it is recommended that selected topics in research, empirical development, and studies of scale-up in numbers and size be supported independently of end-item contracts. In this connection, areas of research lacks are identified, support of empirical development approaches is recommended and scale-up studies are suggested. (Author)

N64-15533
National Beryllia Corp., Haskell, N. J.
RESEARCH ON LOW DENSITY THERMAL INSULATION MATERIALS FOR USE ABOVE 3000°F. Quarterly status rept. no. 6, 1 Jul-30 Sep 63
K. H. Styhr. [1963] 32p
Contract NASr-99
NASA CR-55559
OTS $3.60

Fuels, Lubricants, and Hydraulic Fluids

CONF-124-2
Atomic Energy Commission, Washington, D. C. o Div. of Isotopes Development.
THE STATUS OF WORLDWIDE RADIOISOTOPE APPLICATION TO COAL
George J. Rotariu. [1962] 25p
OTS $2.60

Symposium on the Application of Advanced Technology to Coal Research, Lexington, Ky., Jun 63

DESCRIPTORS: *Coal, Processing, *Nuclear industrial applications.

N64-12400
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
VACUUM LUBRICATION
K. E. Demorest. 25 Jan 62, 25p
MTP-P&VE-M-62-2; NASA TM X-50898
OTS $2.60

AD-277 398
Monsanto Research Corp., Everett, Mass.
EVALUATION OF HYDROCARBONS FOR HIGH TEMPERATURE JET FUELS. PART II: FUEL EVALUATION AND PROPERTY CORRELATION. VOLUME II: HYDROCARBON PROPERTIES. Final rept. for 25 Apr 58-14 Nov 61, on Aviation Fuels
J. O. Smith, B. M. Fabuss and others. Feb 62, 70p
Contract AF33(616)5799
WADC-TR-59-327, Pt. 2, Vol. 2
OTS $6.60

DESCRIPTORS: *Aviation fuels, *Jet engine fuels, Hydrocarbons, Thermodynamics, Physical properties, Tables

The physical and thermodynamic properties of 146 hydrocarbons are tabulated. The properties are given in order of molecular structures: separated rings, condensed rings, spiro compounds, paraffinic hydrocarbons, olefinic hydrocarbons, petroleum fractions. Molecular structures, serial numbers, empirical formulas and all possible names of each hydrocarbon are included. Estimated minimum over-all purity of the hydrocarbon samples is indicated. (DDC abstract) (See also AD-277 397)

AD-285 636
Phillips Petroleum Co., Bartlesville, Okla.
THERMAL STABILITY OF HYDROCARBON FUELS. Summary technical rept. no. 2, 1 May 61-30 Apr 62, on Aviation Fuels
G. D. Kittredge. Jul 62, 139p
Contract AF33(616)7241
ASD-TR-61-238, Part II
OTS $10.50

DESCRIPTORS: *Aviation fuels, *Jet engine fuels, *Storage, Stability, Degradation, Fuels, Hydrocarbons, *Fuel additives, Antioxidants, Impurities, Nondestructive testing, Ultraviolet radiation.

JP-6 fuels deteriorated in thermal stability performance after 52 weeks storage. Sealed storage under a nitrogen atmosphere did not prevent deterioration. Large concentrations of antioxidants might retard fuel storage deterioration as might tighter fuel composition limits on aromatic (and aromatic-olefin) hydrocarbons. Potential deleterious effects were shown by copper contamination in JP-6 fuels, though not at the low concentrations found by analysis in JP-6 fuel samples. Fuel sulfur contamination contributed to thermal instability performance, but showed up adversely in storage performance only in the presence of an aromatic-olefin fuel constituent. Test fuels which deteriorated in performance during storage usually showed decreased UV light transmission, though the converse was not always true. A small scale thermal stability test procedure based on losses in UV light transmission after heating has shown promising ability to rate thermal stability performance of JP fuels in the same order as larger scale test procedures. Tests with special high-temperature-fuels were less promising. (Author) (See also AD-262 338)

AD-299 989
Princeton Univ., N. J.
SOLID PROPELLANT COMBUSTION MECHANISM STUDIES. Progress rept. no. 14, 1 Apr-31 Dec 62
Richard B. Cole and Joseph Wenograd. 31 Jan 63, 28p
Contract Nonr-1858(32)
Aeronautical Engineering rept. no. 446u; ARPA Order no. 23-62-Amendment 21; N63-14243
OTS $2.60

DESCRIPTORS: *Solid rocket propellants, *Combustion, *Solid rocket propellant binders, Temperatures, Surfaces, Flames, Thermocouples, Photographic analysis.

The major goals of the research are the direct photographic observation of burning propellant surfaces and the measurement of surface temperatures by thermocouple techniques. A number of thermocouple records were obtained and from these the surface temperature of a burning composite propellant was found to be near 600° C. High resolution photomicrographs of burning composite solid propellant surfaces were obtained using equipment described in a previous report (AD-281 807). A further analysis of the optical system parameters which affect the photographic observations was carried out and is described. Interesting photomicrographs were obtained for three binder systems with results which are described. (Author)

Plastics

AD-415 920
Monsanto Research Corp., Dayton, Ohio.
GELATIN AS A POSSIBLE STRUCTURAL MATERIAL FOR SPACE USE. Final rept. for 15 Jan 62-15 Feb 63
J. L. Schwendeman, J. L. Robertson, and I. O. Salyer. Jul 63, 80p
Contract AF33(616)8483
ASD-TDR-63-444
OTS $7.60

DESCRIPTORS: *Gelatins, *Structures, Materials, Mechanical properties, Space environmental conditions, Manufacturing methods, Tests, *Laminates, *Glass textiles.

Commercial edible gelatin was investigated as a possible structural material for space use. This investigation was predicated on the probability that gelatin, because of its highly polar nature, would have good mechanical properties if it could be used in a moisture-free environment. Methods of fabricating. films, moldings and glass cloth laminates were developed. A critical moisture-temperature range for molding and fabricating of gelatin was defined. (Author)

AD-423 546
Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
LITERATURE SURVEY ON THERMAL DEGRADATION, THERMAL OXIDATION, AND THERMAL ANALYSIS OF HIGH POLYMERS
David W. Levi. Jun 63, 155p
PLASTEC note 7
OTS $2.75

DESCRIPTORS: *Plastics, Polymers, Degradation, Oxidation, Analysis, *Reviews, *Bibliographies, Abstracts, Indexes.

A bibliography is given of references resulting from a literature survey on thermal degradation, thermal oxidation, and thermal analysis of high polymers. Typical of the materials included are: Polystyrene, polyethylene, polybenzyls, polyphenyls, polyxylenes, hydrocarbon polymers, halogen substituted polymers, polymers containing acid and ester groups, synthetic polymers, and some inorganic and semi-organic systems. The bibliography consists of 813 items, many of which are annotated by the author. These are grouped under general and material headings. To further guide the reader among these there are provided a subject index and an index of authors. (Author)

AD-423 560
Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
SUBJECT INDEX, BIBLIOGRAPHY, AND CODE DESCRIPTION OF TECHNICAL CONFERENCE PAPERS ON PLASTICS: 10 FEBRUARY 1962-10 FEBRUARY 1963
Arnold E. Molzon. Aug 63, 110p
PLASTEC rept. 14
OTS $2.50

DESCRIPTORS: *Plastics, *Conferences, Reports, Subject indexing, *Indexes, *Bibliographies, Coding.

The papers presented at the technical conferences on plastic materials and related technology, within a 1-year period ending 10 February 1963, are listed and indexed by subject. Over 500 papers from 22 conferences are covered. This report serves as a guide to the subjects presented, and by means of a numerical code system, it tells the reader what type of information each article contains. Included are a bibliography and lists of references thereto, on plastic materials and technical data. (Author)

AD-425 370
Rock Island Arsenal Lab., Ill.
PACKAGING IN TRANSPARENT BAGS
Linden W. Wagner. 8 Aug 63, 44p
Rept. no. 63-2583; N64-13315
OTS $1.25

DESCRIPTORS: *Bags (Containers), *Plastic films, *Packing materials, *Corrosion inhibition, Polyvinyl chloride.

Eighteen transparent plastic films of various thicknesses were made into bags. Bare steel panels, panels over-wrapped in vinylidene chloride copolymer, panels coated with an emulsifiable rust preventive and panels protected with volatile-corrosion-inhibitor materials were sealed in the bags. These packs were then subjected to fresh water immersion, static and dynamic humidity, cyclic exposure and one year of indoor storage tests to determine the suitability of plastic bags for packaging applications. The extent, nature and intensity of the rusting of the test specimens were noted through the transparent bag materials. (Author)

MATHEMATICS

HW-74787
Hanford Atomic Products Operation, Richland, Wash.
GRAPH THEORY AND SYSTEMS OF EQUATIONS
T. A. Newton. 20 Jun 63, 31p
Contract AT(45-1)1350
OTS $3.60

DESCRIPTORS: *Mathematics, *Graphic analysis.

N64-15784
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ASYMPTOTIC EXPANSIONS OF NAVIER-STROKES SOLUTIONS IN THREE DIMENSIONS FOR LARGE DISTANCES
Stephan Childress. 15 Jan 64, 74p
Contracts NAS7-100, NASw-6, and AF49(638)521
Technical rept. no. 32-480; NASA CR-53055
OTS $7.60

N64-14289
Minneapolis-Honeywell Regulator Co., Minn.
A CONCISE FORMULATION OF A BOUNDED PHASE COORDINATE CONTROL PROBLEM AS A PROBLEM IN THE CALCULUS OF VARIATIONS
W. W. Schmaedeke and D. L. Russell. 12 Dec 63, 7p
Contract NASw-563
MH MPG Rept. 1541-TR-10; NASA CR-55351
OTS $1.10

N64-14153
Minneapolis-Honeywell Regulator Co., Minn.
ROCKET BOOSTER CONTROL. SECTION 4: A SUFFICIENT CONDITION IN OPTIMAL CONTROL
E. B. Lee. 10 Dec 63, 13p
Contract NASw-563
MH MPG rept. 1541-TR-4; NASA CR-55352
OTS $1.60

PB-165 227
[Research Analysis Corp., McLean Va.]
GAME THEORY FOR WAR GAMING. Staff paper
David Blackwell. Apr 57, 92p
[Contract DA44-109-qm-266]
ORO-SP-9; AD-236 152
OTS $8.60

DESCRIPTORS: *Game theory, *Military strategy, Probability, Mathematical analysis, Operations research, *Warfare.

Contents: Mixed strategies and value--finite, solution of finite games, perfect information games, mixed strategies and value--general games, a mine VS tank model, an attrition model, and on the redistribution of forces along a front.

PB-165 215
[Research Analysis Corp., McLean, Va.]
GENERALIZED BATTLE GAMES ON A DIGITAL COMPUTER. Technical memo. on Project OPSEARCH
W. E. Cushen. 19 Feb 54, 72p
[Contract DA44-109-qm-266]
ORO-T-263; AD-53 283
OTS $7.60

DESCRIPTORS: *Game theory, *Warfare, *Military tactics, Mathematical models, Probability, Digital computers, *Operations research, *Programming (Computers), Monte Carlo method.

The model proposed here provides a scheme for solving the computer equivalent of map exercises which is simultaneously realistic, general, immediately usable with digital computing facilities currently available, much less expensive than current prediction techniques, and capable of giving a larger sample upon which to base planning. The test case involving a tank company's action in World War II demonstrates the feasibility of using the method. This is a report on a stage of development of operations research techniques on tactical problems, and there are no immediate recommendations for Army action. The success of this Phase is sufficiently promising to warrant continuation of the project. Recommendations will arise from the application of these techniques to the solution of tactical problems, including an evaluation of the prospect of using computer battles as a training aid. (Author)

PB-165 234
[Research Analysis Corp., McLean, Va.]
THE STRATSPIEL PILOT MODEL. Technical paper
Joseph O, Harrison Jr., and Edward M. Lee.
Aug 60, 97p
[Contract DA44-109-qm-266]
ORO-TP-7; AD-243 663
OTS $8.60

DESCRIPTORS: *Armed forces operations, *Game theory, Models (Simulations), Digital computers, Political science, Warfare.

An attempt was made to develop a pilot model strategic game incorporating both political and military factors, and to explore the degree to which a computer could be used for bookkeeping, computing, and communication purposes in strategic gaming. The general situation represented by the model is that of a two-sided struggle continuing over a period of time. The two principal variables of the game are political control and condition. Each player has available to him a spectrum of force which he may use in bidding for an amount of his opponent's political control; force also lowers the condition of the opposing player. The first schedule of plays of the model was directed toward examining the effects of restricted force availability on one of the two sides. It turned out that on the average a player who was prevented by the rules of the game from utilizing an intermediate level of force was at a disadvantage relative to his opponent. In general the plays of the game were marked by spirited competition for political control to the exclusion of attempts at cooperation or compromise on the basis of potential mutual benefit. There is some evidence that restricted force availability on one side tends to moderate the competitive behavior. Elements of an advanced model are proposed, drawing on the experience gained with the pilot model as to both technique of play and substantive improvements. (Author)

PB-165 222
[Research Analysis Corp., McLean Va.]
A SURVEY OF HISTORICAL DEVELOPMENTS IN WAR GAMES. Staff paper
John P. Young. Apr 60, 121p
[Contract DA44-109-qm-266]
ORO-SP-98; AD-210 865
OTS $10.10

DESCRIPTORS: *Game theory, *Military strategy, Warfare, Armed forces operations, History, Operations research, Reviews.

In the military field, particular attention has been directed toward the use of war gaming as a decision tool both for peacetime evaluation of requirements and for wartime planning of campaigns. This survey of the historical developments of war gaming is not intended as an evaluation of the various methods and theories of gaming. Rather, it is offered as a backdrop for current practices and procedures. Specifically, the war game will be traced from very early times, when it was treated as a modified chess game and used principally for pleasure, through a period when it was developed into modern military training and research devices.

PB-165 226
[Research Analysis Corp., McLean Va.]
THE VALUE CONCEPT FOR RUIN GAME PROBLEMS. Staff paper
Franklin C. Brooks. Apr 57, 24p
[Contract DA44-109-qm-266]
ORO-SP-10; AD-236 153
OTS $2.60

DESCRIPTORS: *Game theory, Military strategy, Probability, Mathematical analysis, Operations research *Weapons.

Contents: The value concept applied to two simple ruin game problems, approximate value function for the non-conservative ruin game, and a note on weapons effectiveness.

Computing Devices

WANL-TNR-063
Astronuclear Lab., Westinghouse Electric Corp., Pittsburgh, Pa.
ACTIVATION SOURCE STRENGTH PROGRAM. ACT I FOR THE IBM 7090 COMPUTER
P. C. Heiser and L. O. Ricks. Sep 62, 41p
Contract AT(30-1)3108
OTS $4.60

DESCRIPTORS: Gamma rays, *Programming (Computers), *Radioactivity.

TID-17375
Digital Computer Lab., Univ. of Ill., Urbana.
DESIGN OF A PATTERN RECOGNITION DIGITAL COMPUTER. PART I: GENERAL INTRODUCTION.
B. H. McCormick. 1 Oct 62, 31p
Contract AT(11-1)1018
Rept. no. 125
OTS $3.60

DESCRIPTORS: *Digital computers, Pattern recognition,

HW-69871
Hanford Atomic Products Operation, Richland, Wash.
CORRELATION OF EXPERIMENTAL ACTIVITY TRAVERSES USING FEW GROUP NEUTRON DIFFUSION THEORY: COMPUTER PROGRAM FIT-1
J. R. Lilley. 21 Jun 61, 27p
Contract AT(45-1)1350
OTS $2.60

DESCRIPTORS: *Programming (Computers), *Neutron transport theory

UCRL-7624
Lawrence Radiation Lab., Univ. of California, Livermore.
SOPHIST-5, AN IBM 7090/7094 FORTRAN II CODE WHICH CALCULATES MULTIGROUP ENERGY TRANSFER MATRICES FOR ANISOTROPIC ELASTIC SCATTERING OF NEUTRONS
Eugene Canfield. 18 Dec 63, 31p
Contract W7405-eng-48
OTS $0.75

ORNL-3460
Oak Ridge National Lab., Tenn.
THE OAK RIDGE ALGOL COMPILER FOR THE CONTROL DATA CORPORATION 1604. PRELIMINARY PROGRAMMER'S MANUAL.
L. L. Bumgarner. [Feb 64] 46p
Contract W7405-eng-26
OTS $1.25

DP-846
Savannah River Lab., Aiken, S. C.
AN ANALOG COMPUTER FOR THE SOLUTION OF LINEAR SIMULTANEOUS EQUATIONS
Robert C. Propst and Robert F. Overman. Dec 63, 20p
Contract AT(07-2)1
OTS $0.50

WCAP-6058
Westinghouse Electric Corp., Pittsburgh, Pa.
CNCR-2. A ONE-DIMENSIONAL FEW GROUP DEPLETION CODE FOR THE IBM-7090, WHICH INCLUDES THE EFFECTS OF WATER DENSITY VARIATIONS ON NEUTRON MODERATION.
S. M. Hendley and R. A. Mangan. Jan 64, 110p
Contract AT(30-1)3017
OTS $2.25

MECHANICS

CONF-153-1
Sandia Corp., Albuquerque, N. Mex.
CALIBRATION OF CRYSTAL ACCELEROMETERS USED FOR VIBRATION AT TEMPERATURE EXTREMES
C. M. Warthen. [1962] 6p
Contract AT(29-1)789
SCDC-3033
OTS $1.10

Interagency Mechanical Operations Group, Subgroup on Environmental Testing, Meeting No. 3, Albuquerque, N. Mex., Sep 62.

SCTM-107-63(73)
Sandia Lab., Albuquerque, N. Mex.
INVESTIGATION OF A FLEXURE-SUPPORTED VIBRATION FIXTURE
C. T. Schafer, Jul 63, 321
Contract AT(29-1)789
OTS $3.60

DESCRIPTORS: *Vibration, Test equipment,

Aerodynamics and Pneumatics

N64-13188
Alabama Univ. Research Inst., Huntsville.
NON-EQUILIBRIUM HYPERSONIC FLOW OF AIR IN HYPERSONIC NOZZLES AND AROUND BLUNT BODIES. Research rept. no. 5
Janardanarao Yalamanchili, Rudolf Herman, and Jurgen Thoenes. Aug 63, 19p
Grant NsG-381; Contract DA01-009-AMC-18(Z)
NASA CR-55139
OTS $1.60

Presented at the Fifth International Symposium on Space Technology and Science, Tokyo, Japan, Sep 2-7, 1963.

AD-287 400
Bureau of Naval Weapons, Washington, D. C.
MISSILE FLIGHT AND ASTRODYNAMICS. Rept. for 1959-1961
John D. Nicolaides. [1962] 482p
Technical note no. 100A, Pt. 1
OTS $23.50

DESCRIPTORS: *Aerodynamics, *Astronautics, *Guided missiles, *Ballistics, Trajectories, Motion, Stability, Equations of motion, Moments, Yaw, Engineering, Design.

Contents:
Trajectories and orbits
Simple angular motion
General rigid body motion and stability
Unified linear theory of missile flight dynamics
Some non-linear problems in missile flight dynamics
Missile design considerations

PB-165 206
Lockheed-California Co., Burbank.
STUDY TO DETERMINE SKIN-FRICTION DRAG IN HYPERSONIC LOW-DENSITY FLOW. Volume I: SUMMARY ANALYSIS.
Final rept. for Jun 60-Jun 61
W. Leon Francis, Frank S. Malvestuto, Jr., and Jay W. Stuart, Jr. Apr 62, 357p
Contract AF33(616)7261
ASD-TR-61-433, Volume I; N62-13479
OTS $21.00

DESCRIPTORS: *Atmosphere entry, *Hypersonic flight, *Re-entry vehicles, *Friction, Aerodynamic characteristics, Superaerodynamics, Theory, Tests, Drag, Hypersonic flow.

This report presents results of a theoretical and experimental investigation to develop improved methods for estimating the skin friction effects on the aerodynamic characteristics of re-entry vehicles operating at hypersonic speeds in low-density regions from the continuum to the free-molecular regime. Methods and design charts are developed whereby rapid engineering estimates may be made of the skin friction on configurations operating in hypersonic, low-density flow and include the effects of slip and shock wave/boundary-layer interaction. These results are examined in detail to ascertain the degree of precision necessary in predicting skin friction effects on a glide-vehicle during a typical re-entry trajectory and reasonable accuracy tolerances are specified. It is concluded that viscous interaction effects influence to a large extent the aerodynamic performance of typical re-entry vehicles in the hypersonic, low-density flight regimes and that slip/transition flow effects influence the performance to a relatively minor extent. It is also determined that skin friction in the low density flow range of interest [$\mathcal{O}(1)) < Re < \mathcal{O}(10^6)$] will most likely be of the laminar type and thus turbulent flow considerations are of lesser importance. (Author)

N63-23818
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
STUDIES ON ABLATION OF OBJECTS TRAVERSING AN ATMOSPHERE
Ernst W. Adams, John D. Warmbrod, and Benton K. Berry. 19 Jun 63, 42p
MTP-AERO-63-47; NASA TM X-50999
OTS $4.60

AD-425 694
Southampton Univ. (England)
SPACE TIME CORRELATIONS OF THE BOUNDARY LAYER PRESSURE FIELD IN NARROW FREQUENCY BANDS. Rept. for Jan 60-Nov 61
M. K. Bull. Nov 63, 30p
Contract AF61(052)358
A.A.S.U. 200; ASD-TDR-62-722; N64-14320
OTS $0.75

DESCRIPTORS: *Correlation techniques, *Turbulent boundary layer, Surface area, Pressure, Signals, Narrowband, Frequency, Time, Equations,

Expressions are derived for the space-time correlation of the surface pressure field of a turbulent boundary layer in narrow frequency bands. On the basis of convection of an 'almost frozen' pressure field the amplitude of the filtered correlation in the flow direction is found to be dependent on spatial separation but independent of frequency. Empirical representations of the overall correlations of the pressure field and experimental measurements are given to illustrate the results obtained. (Author)

Hydrodynamics, Hydraulics, and Hydrostatics

PB-165 243
David Taylor Model Basin, Washington, D. C.
A NOMENCLATURE FOR STABILITY AND CONTROL
Frederick H. Imlay. May 59, 65p
Rept. 1319; AD-219 607
OTS $6.60

DESCRIPTORS: *Naval research, *Hydrodynamics, Vocabulary, Standardization, Naval equipment, Stability, Control.

A general purpose nomenclature is presented for dealing with problems in stability and control of surface ships, submarines, torpedoes, and towed bodies. The nomenclature is an extension of the nomenclature for submerged bodies that was adopted by the American Towing Tank Conference in 1948. (Author)

AD-421 613
Harry Diamond Labs., Washington, D. C.
FLUID AMPLIFICATION. 11. STAGING OF PROPORTIONAL AND BISTABLE FLUID AMPLIFIERS
Silas Katz and Robert J. Dockery. 30 Aug 63, 52p
TR-1165
OTS $1.50

DESCRIPTORS: *Amplifiers, *Parametric amplifiers, *Hydraulic servomechanisms, Servo amplifiers, *Liquid jets, Fluid flow.

The generalized performance characteristics are examined in detail for both proportional and bistable (digital) fluid amplifiers with no moving parts. An approach leading to the solution of fluid systems design problems is given. Equations describing the pressure and flow variations are developed. Typical performance curves are drawn showing performance trends with several variables manipulated. Experimental curves are presented confirming the theoretical approach. A typical proportional unit, with principal dimensions, is shown with its characteristic curves. (Author) (See also AD-405 867)

N64-14271
Advanced Metals Research Corp., Somerville, Mass.
PROPERTIES OF NON-STOICHIOMETRIC METALLIC CARBIDES. Quarterly progress rept. no. 3
J. T. Norton and R. K. Lewis. 12 Dec 63, 9p
Contract NASw-663
NASA-CR-55272
OTS $1.10

USBM-U-1091
Albany Metallurgy Research Center, Ore.
METALLURGICAL QUARTERLY PROGRESS REPT. NO. 21, OCTOBER 1-DECEMBER 31, 1963. [1964] 26p
Contract AT(11-1)599
OTS $0.75

CONF-53-5
Battelle Memorial Inst., Columbus, Ohio.
ELEVATED-TEMPERATURE CREEP AND TENSILE PROPERTIES OF THREE COLUMBIUM-BASE ALLOYS
J. A. DeMastry, F. R. Shober, and R. F. Dickerson. [1961] 22p
Contract W7405-eng-92
OTS $2.60

World Metal Show, New York, Oct-Nov 62

DESCRIPTORS: *Niobium alloys, Tensile properties

AD-299 500
Bell Aerosystems Co., Buffalo, N. Y.
EDGE PREPARATION OF REFRACTORY ALLOYS PRIOR TO THE APPLICATION OF PROTECTIVE COATINGS
C. W. Campbell. 28 Jan 62, 7p
Contract AF33(657)8555
Rept. no. BLR 62-43(P)
OTS $1.10

DESCRIPTORS: *Heat-resistant metals and alloys, *Molybdenum alloys, *Niobium alloys, Protective treatments, Tungsten, Ball mills, Manufacturing methods, Abrasives, Preparation, Coatings, Processing

AD-401 303
Cincinnati Milling Machine Co., Ohio.
HIGH TEMPERATURE MACHINING METHODS. Final rept. for 5 Sep 59-11 Oct 62
Irving A. Dickter, Clarence L. Mehl, and Russell F. Henke. 23 Jan 63, 358p
Contract AF33(600)40066
ASD-TDR-63-125
OTS $4.00

DESCRIPTORS: *Machining, *Hot-working, Steel, Stainless steel, Nickel alloys, Cobalt alloys, Molybdenum alloys, Aluminum alloys, Heat resistant metals and alloys, *Induction heating, Resistance (Electrical), Torches, *Machine shop practice, Grain structure (Metallurgy).

Hot machining can reduce the cost of manufacturing parts from many high strength steels, precipitation hardening stainless steels, and nickel and cobalt based alloys. Selection of parts with suitable materials, and proper planning of set-up and sequence of operations, materially influences the final cost. Manufacturing costs of aerospace parts when hot machined from heat treated AISI 4340 and Ph 15-7 Mo steels were reduced up to 36% when compared to conventional machining. Radio-frequency induction and resistance heating techniques were developedand proved practical for heating magnetic materials, while the inert tungsten arc torch was more satisfactory for non-magnetic materials. Most high strength metals will show a significant increase in tool life and permissible metal removal rates at elevated temperatures. Hot machining of 6 Al 4 V, 13 V 11 Cr 3 Al titanium alloys and refractory metals and alloys, achieved only limited success. While some metallurgical changes were observed on the hot machined nickel and cobalt based alloys, these changes were not severe or extensive. No excessive safety or health hazards are involved. (See also AD-276 882) (Author)

RFP-342
Dow Chemical Co., Golden, Colo.
A METHOD OF STRIPPING AND REPLATING NICKEL ELECTROPLATED URANIUM
W. H. Roberts. 9 Mar 64, 8p
Contract AT(29-1)1106
OTS $0.50

GA-3367
General Atomic Div., General Dynamics Corp., San Diego, Calif.
THERMALLY ACTIVATED DISLOCATION MOTION IN FCC AND REFRACTORY BCC METALS
R. H. Chambers. 12 Aug 62, 7p
Contract AT(04-3)167
OTS $1.10

DESCRIPTORS: *Heat-resistant metals and alloys, Internal friction,

HW-79766
Hanford Atomic Products Operation, Richland, Wash.
METALLURGY RESEARCH OPERATION. Quarterly progress rept. for Oct-Dec 63. 15 Jan 64, 189p
Contract AT(45-1)1350
OTS $2.75

UCRL-6984
Lawrence Radiation Lab., Univ. of California, Livermore.
GRAIN SIZE MEASUREMENTS IN URANIUM BY USE OF ULTRASONICS
H. L. Dunegan. 2 Jul 62, 35p
Contract W7405-eng-48
OTS $3.60

DESCRIPTORS: *Uranium, *Ultrasonic radiation, *Non-destructive testing.

UCRL-7595
Lawrence Radiation Lab., Univ. of California, Livermore.
A STUDY OF THE EFFECT OF ALLOYING ON THE GAMMA-PHASE STABILITY OF URANIUM USING VACUUM DIFFERENTIAL THERMAL ANALYSIS
C. A. W. Peterson and W. J. Steele. 12 Nov 63, 50p
Contract W7405-eng-48
OTS $1.25

MITS-51
Massachusetts Inst. of Tech., Cambridge.
ADAPTATION OF NEW RESEARCH TECHNIQUES TO MINERAL ENGINEERING PROBLEMS. Annual progress rept. for period ending 31 Oct 63. [1963] 20p
Contract AT(30-1)956
NYO-10330
OTS $0.50

AD-402 713
Solar, San Diego, Calif.
JOINING OF REFRACTORY METAL FOILS. Quarterly progress rept. no. 3, 1 Jan-31 Mar 63
15 Apr 63, 481p
Contract AF33(657)9442
Rept. no. RDR1324 3
OTS $23.50

DESCRIPTORS: *Molybdenum alloys, *Niobium alloys, Titanium alloys, *Zirconium alloys, Tungsten alloys, Vanadium alloys, Arc welding, Brazing, Silver solders, *Foils, Honeycomb cores, Sandwich construction, Microstructure, Tensile properties, Creep, Electron beams, Ultrasonic radiation, Resistance welding, Thermal joining.

Welding, brazing, and mechanical property evaluation was directed toward the Nb-5V-5Mo-1Zr alloy (B66). Mechanical property tests of both 0.006- and 0.010-in. foil showed room temperature properties in the range of 102 to 105 ksi ultimate strength, 77 to 79 ksi yield strength, and 26 to 30% elongation. Short-time high-temperature strength measurements gave values of 55 ksi ultimate, 49 ksi yield strength, and ductility averaging 55% in a 1-in. and 38% in a 2-in. gage length. At 2450 F, the ultimate strength and 0.2% offset yield strength were nearly identical at levels around 28.5 ksi. Ductility in the latter case was recorded as high as 91% in a 1-in. gage length measurement. Both electron beam and tungsten inert gas welding schedules were studied. Some resistance welding work on B66 was carried out. Ultrasonic welding of the B66 alloy as reported by Aeroprojects Corporation of Westchester, Pennsylvania, was to the effect that the material is weldable by the ultrasonic process. General Electric, Martin (Ti-8.5Si), and Solar (RGN) brazing alloys were evaluated for joining B66 material. (Author)

TID-19489
Stanford Research Inst., Menlo Park, Calif.
HIGH TEMPERATURE OXIDATION AND NITRIDATION OF NIOBIUM IN ULTRAHIGH VACUUM. Interim rept. 1 Jun 62-1 Jul 63.
R. A. Pasternak. 15 Feb 64, 52p
Contract AT(04-3)115
OTS $1.25

CONF-127-1
United Nuclear Corp., New Haven, Conn.
RECENT ADVANCES IN THE POWDER METALLURGY OF URANIUM CARBIDES
Herbert S. Kalish. 31 Oct 62, 22p
Contract AT(30-1)2374
OTS $2.60

MPIF-ASM Powder Metallurgy Symposium National Metals Congress, New York, Oct-Nov 62

DESCRIPTORS: *Uranium, *Carbides, *Powder metallurgy.

GEAP-4271
Vallecitos Atomic Lab., General Electric Co., San Jose, Calif.
THE MEASUREMENT OF OXYGEN TO METAL RATIO IN SOLID SOLUTIONS OF URANIUM AND PLUTONIUM DIOXIDES
W. L. Lyon. 31 May 63, 26p
Contract AT(04-3)189
OTS $0.75

Ferrous Metals

PB-163 541
Instituto de la Soldadura, Madrid (Spain).
WELDING METALLURGY OF STEELS. Progress rept. no. 1
F. A. Calvo, A. Revuelta, and J. L. Oritz Matarrubia. Jun 61, 174p
OTS $12.50

DESCRIPTORS: *Steel, *Welding, Arc welding, *Grain structures (Metallurgy), Transformations, Test methods

The Polished Surface Technique was set up. The technique was developed for studies on metallurgical transformations in the Heat Affected Zone (HAZ) produced by arc welding. In this technique, a HAZ is produced on a previously polished surface which is kept polished during the experiments. These are carried out in a chamber while an inert gas is flowing. The chamber may stand on the microscope stage, the experiment being observed through a glass window facing the polished surface of the specimen. Exploratory work was carried out on some plain carbon and low alloy steels. Correlation was established between the microstructures at various points on each specimen, before and after it has been affected by the heat. The microstructures obtained are discussed, and a mechanism for the transformations is proposed. (Author)

PB-163 542
Instituto de la Soldadura, Madrid (Spain).
WELDING METALLURGY OF STEELS. Progress rept. no. 2
F. A. Calvo, A. Revuelta, and L. Mompean. Jun 62, 209p
OTS $14.00

DESCRIPTORS: *Steel, *Welding, Arc welding, *Grain structures (Metallurgy), Pearlite, Austenite, Transformations, Test methods

A new technique, called the Polished Surface Technique, was developed for studies of welding metallurgy. In this technique, the specimens are discs of 25 mm. diameter, one of whose faces has been polished. The specimen is placed in a special water cooled chamber, which is filled with some pure inert gas or mixture. An arc is discharge between a tungsten electrode and the specimen. A heat affected zone is produced on the polished surface. Tests were carried out on two plain carbon steel, on an eutectoid steel, and on two low alloy types (Cr-Ni). Some experiments have just started on an Armco iron. Correlation between initial and final microstructures was established for various thermal cycles. Special attention was devoted to the pearlite austenite transformation, and to the identification of the constitutents of the very complex microstructures that are usually found in heat affected zones on steels. The mechanism of their formation is discussed. (Author) (See also PB-163 541)

N63-23028
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
EVALUATION OF WELDED 2219-T87 ALUMINUM ALLOY
Richard A. Davis. 19 Dec 62, 35p
MTP-P&VE-M-62-16; NASA TM X-50837
OTS $3.60

ORNL-3557
Oak Ridge National Lab., Tenn.
MECHANICAL PROPERTIES OF X8001 AND 6061 ALUMINUM ALLOYS AND ALUMINUM-BASE FUEL DISPERSION AT ELEVATED TEMPERATURES
W. R. Martin and J. R. Weir. Feb 64, 33p
Contract W7405-eng-26
OTS $0.75

ORNL-3526
Oak Ridge National Lab., Tenn.
SELF-DIFFUSION OF BERYLLIUM IN UNIRRADIATED, COLD-PRESSED AND SINTERED BERYLLIUM OXIDE
H. J. de Bruin and G. M. Watson. [Feb 64] 37p
Contract W7405-eng-26
OTS $0.75

PB-165 254
Propulsion Lab. [Aeronautical Systems Div.] Wright-Patterson AFB. Ohio.
RESULTS OF IMPACT TESTING OF TITANIUM WITH LIQUID OXYGEN
George A. Beane. Apr 59, 11p
WADC TN 59-175; AD-232 573
OTS $1.60

DESCRIPTORS: *Titanium alloys, *Impact shock, *Cryogenics, Liquefied gases, Oxygen, Aluminum alloys, Vanadium alloys.

Three different alloys of Titanium (Ti, 75A; Ti, 6A, and B-120VCA) were subjected to a force of impact while in the presence of liquid oxygen. The data thus produced indicates that each of these alloys will readily react with liquid oxygen under certain conditions of impact. (Author)

TID-16676
Savannah River Lab., Aiken, S. C.
THE DIFFUSION OF LITHIUM IN ALUMINUM
L. P. Costas. 17 Sep 62, 7p
Contract AT(07-2)1
OTS $1.10

DESCRIPTORS: *Lithium, *Diffusion, *Aluminum,

GEAP-3726(Vol. 3)
General Electric Co., San Jose, Calif.
SODIUM MASS TRANSFER: II. SCREENING TEST DATA AND ANALYSIS. VOLUME 3. CORROSION SAMPLE DATA. May 62, 190p
Contract AT(04-3)189
OTS $3.00

N63-23014
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
STRESS CORROSION OF HIGH-STRENGTH ALUMINUM ALLOYS
T. S. Humphries. 24 Jun 63, 22p
MTP-P&VE-M-63-8; NASA TM X-50924
OTS $2.60

ORNL-3541
Oak Ridge National Lab., Tenn.
EFFECT OF HEAT FLUX ON THE CORROSION OF ALUMINUM BY WATER. PART IV. TESTS RELATIVE TO THE ADVANCED TEST REACTOR AND CORRELATION WITH PREVIOUS RESULTS.
J. C. Griess, H. C. Savage, and J. L. English. Feb 64, 35p
Contract W7405-eng-26
OTS $1.00

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

TID-16627
Argonne National Lab., Ill.
HALF-LIFE OF Kr^{85}
J. Lerner. Jun 62, 21p
Contract W31-109-eng-38
UAC-6514
OTS $2.60

DESCRIPTORS: *Krypton, *Isotope, *Half life.

ANL-6848
Argonne National Lab., Ill.
NUCLEAR SPECTROSCOPY WITH DIRECT REACTIONS I: CONTRIBUTED PAPERS.
F. E. Throw, ed. Mar 64, 258p
Contract W31-109-eng-38
OTS $3.00

TID-16638
Argonne National Lab., Ill.
SEARCH FOR DELAYED NEUTRON EMISSION IN Br^{86} DECAY
Ellis P. Steinberg and Larry L. Schwartz. 25 Jun 62, 10p
Contract W31-109-eng-38
UAC-6574
OTS $1.10

DESCRIPTORS: *Bromine, Uranium, *Isotopes, *Thermal neutron.

TID-4202
Atomic Energy Commission, Washington, D. C., Div. of Isotopes Development.
ISOTOPE DEVELOPMENT PROGRAM: CONTRACT SCOPE STATEMENTS. Sep 63, 108p
OTS $2.25

EFINS-63-40
Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
ON THE UNIQUENESS OF THE PARTIAL WAVE AMPLITUDES
A. P. Balachandran. [1963] 8p
Contract AT(11-1)264
OTS $1.10

DESCRIPTORS: *Elementary particles, Scattering.

EFINS-63-25
Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
SELF-CONSISTENT MODELS OF STRONG INTERACTION WITH CHIRAL SYMMETRY
Yoichiro Nambu and Pedro Pascual. Apr 63, 19p
Contract AT(11-1)264
OTS $1.60

DESCRIPTORS: *Field theory, *Elementary particles.

EFINS-63-35
Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
VECTOR MESONS AS REGGE POLES IN PERTURBATION THEORY
Peter G. O. Greund and Reinhard Oehme. May 63, 14p
Contract AT(11-1)264
OTS $1.60

DESCRIPTORS: *Perturbation theory, *Elementary particles, *Field theory, Scattering,

CONF-13-5
Kentucky Univ., Lexington.
STUDY OF ALPHA-PARTICLES EMITTED BY CsI(Tl) BOMBARDED WITH FAST NEUTRONS
F. Gabbard, T. Young, and J. L. Beach. [1962] 5p
Contract AT(40-1)2067
OTS $1.10

DESCRIPTORS: *Alpha particles, Cesium, Iodides, Crystals, *Fast neutrons, Neutron reactions

American Physical Society 1963 Southwestern Meeting, Houston, Texas, Feb 63

LADC-5391
Los Alamos Scientific Lab., N. Mex.
EXPERIMENTAL STUDY OF THE $Mg^{26}(He^3, \alpha)Mg^{25}$ REACTION
A. G. Blair and H. E. Wegner. [1962] 8p
Contract W7405-eng-36
OTS $1.10

DESCRIPTORS: *Magnesium, *Helium, *Isotopes,

RRL-87
Radiation Research Labs., Mellon Inst., Pittsburgh, Pa.
METHYL RADICAL PRODUCTION IN THE RADIOLYSIS OF HYDROCARBONS
Robert H. Schuler and Robert R. Kuntz. 27 Aug 62, 33p
Contract AT(30-1)2310
NYO-10308
OTS $3.60

DESCRIPTORS: *Hydrocarbons, *Radiolysis, *Methyl radicals, *Radiation chemistry,

NYO-10276
Rochester Univ., N. Y.
A CLASS OF LORENTZ INVARIANT HAMILTONIAN MODELS OF INTERACTING PARTICLES
R. Acharya. 9 Jul 63, 13p
Contract AT(30-1)875
OTS $1.60

DESCRIPTORS: *Quantum mechanics, Scattering, *Field theory, *Elementary particles

NYO-10274
Rochester Univ., N. Y.
SU(3) SYMMETRY SCHEME. A REVIEW.
Georges W. London. 21 May 63, 29p
Contract AT(30-1)875
OTS $2.60

DESCRIPTORS: *Elementary particles,

Elementary Particles

UCRL-2426(Vol. I) (1963 Rev.)
Lawrence Radiation Lab., Univ. of California, Berkeley.
HIGH-ENERGY PARTICLE DATA: VOLUME I. KINEMATICS OF PARTICLES AS A FUNCTION OF KINETIC ENERGY
W. Peter Trower, Beverly Hill Willis, and Charles V. Stableford. 1 Jul 63, 125p
Contract W7405-eng-48
OTS $2.50

MURA-679
Midwestern Universities Research Association, [Madison] Wis.
PARTICLE DYNAMICS IN LINEAR ACCELERATORS
Phil Lee Morton. Doctoral thesis. 13 Dec 63, 120p
Contract AT(11-1)384
OTS $2.25

NYO-10716
Radiological Research Lab., Columbia Univ., New York.
STATISTICAL FLUCTUATIONS IN THE ENERGY LOSS OF 5.8 MEV ALPHA PARTICLES PASSING THROUGH AN ABSORBER OF VARIABLE THICKNESS
Walter Rosenzweig and Harald H. Rossi. 1 Nov 63, 99p
Contract AT(30-1)2740
OTS $2.25

Instruments and Installations

TID-16640
Argonne National Lab., Ill.
A SOLID STATE PULSE-HEIGHT ENCODING SYSTEM WITH PILE-UP REDUCTION FOR COUNTING AT HIGH INPUT RATES
Michael G. Strauss. Jun 62, 41p
Contract W31-109-eng-38
UAC-6547
OTS $4.60

DESCRIPTORS: Data, *Recording systems, *Pulse analyzers

CONF-67-27
Brookhaven National Lab., Upton, N. Y.
NEW MONITORING MEANS FOR AIRBORNE TRITIUM DETERMINATION
David O. Clark and Carl Distenfeld. [1962] 13p
Contract AT(30-2)GEN-16
OTS $1.60

Health Physics Society Eighth Annual Meeting New York, Jun 63

DESCRIPTORS: *Radiation monitors, Air, *Tritium,

HW-78956
Hanford Atomic Products Operation, Richland, Wash.
A METHOD FOR BETA-GAMMA HAND SHOE COUNTING UNDER VARYING BACKGROUND CONDITIONS
W. G. Spear. Oct 63, 23p
Contract AT(45-1)1350
OTS $0.75

UCRL-10626
Lawrence Radiation Lab., Univ. of California, Berkeley.
BEVATRON OPERATION AND DEVELOPMENT NO. 35. Rept. for Jul-Sep 62
Kennith C. Crebbin and Rudin M. Johnson. 16 Dec 63, 23p
Contract W7405-eng-48
OTS $0.50

UCRL-10874
Lawrence Radiation Lab., Univ., of California, Berkeley.
A MULTIPARAMETER PULSE-HEIGHT RECORDING SYSTEM
Michiyuki Nakamura and George S. Simonof. Apr 63, 10p
Contract W7405-eng-48
CONF-103-1
OTS $1.10

Conference on Instrument Techniques in Nuclear Pulse Analysis, Monterey, Calif., Apr-May 63

DESCRIPTORS: *Magnetic recording systems.

UCRL-7611
Lawrence Radiation Lab., Univ. of California, Livermore.
THE LPTR SINGLE-CRYSTAL NEUTRON SPECTROMETER AND REACTOR SPECTRUM MEASUREMENTS
Ian R. Jones. 1 Dec 63, 58p
Contract W7405-eng-48
OTS $1.25

ORNL-3444
Oak Ridge National Lab., Tenn.
PHASE MOTION OF IONS IN ISOCHRONOUS CYCLOTRONS
F. M. Russell. Jan 63, 34p
Contract W7405-eng-26
OTS $0.75

CONF-39-53
Phillips Petroleum Co., Idaho Falls.
A DIFFERENTIAL CALORIMETER FOR RADIATION-INDUCED POWER
William Bradley Lewis. [1963] 16p
Contract AT(10-1)205
OTS $1.60

American Nuclear Society Meeting, Salt Lake City, Utah, Jun 63

TID-15765
Sandia Corp., Albuquerque, N. Mex.
PORTABLE RADIAC EQUIPMENT AT SANDIA, ITS CALIBRATION AND USE
G. E. Tucker, Jr. 3 Apr 62, 5p
Contract AT(29-1)789
SCDC-2633X
OTS $1.10

DESCRIPTORS: *Radiation measurement systems, Portable, Calibration,

Isotope Separation

CONF-8-5
Mound Lab., Miamisburg, Ohio.
FACTORS AFFECTING THE DESIGN CRITERIA OF GASEOUS THERMAL DIFFUSION SEPARATION SYSTEMS
W. J. Haubach. [1962] 15p
Contract AT(33-1)GEN-53
OTS $1.60

American Inst. of Chemical Engineers Meeting, Buffalo, N. Y., May 63.

DESCRIPTORS: *Isotope separation, *Thermal diffusion separation.

TID-18966
Oak Ridge Gaseous Diffusion Plant, Tenn.
AN INVESTIGATION OF SOME PROBLEMS INVOLVED IN THE SEPARATION OF MULTICOMPONENT MIXTURES HAVING SMALL SEPARATION FACTORS
T. C. Tucker. 5 Jun 63, 105p
Contract W7405-eng-26
KOA-1160
OTS $9.10

DESCRIPTORS: *Isotope separation, *Isotopes *Tungsten

NP-12998
AMF Atomics, Inc., Greenwich, Conn.
APTR CRITICAL EXPERIMENT HAZARD SUMMARY REPORT Jun 63, 110p
OTS $9.10

DESCRIPTORS: *Critical assemblies, *Research reactors,

TID-16621
Argonne National Lab., Ill.
NUCLEAR LEVELS OF F^{20}
Carl T. Hibdon. Jun 62, 43p
Contract W31-109-Eng-38
UAC-6570
OTS $4.60

DESCRIPTORS: *Fluorine, Isotopes, *Neutron scattering *Nuclear energy levels

ANL-6792
Argonne National Lab., Ill.
PROCEEDINGS OF THE CONFERENCE ON BREEDING, ECONOMICS AND SAFETY IN LARGE FAST POWER REACTORS, OCTOBER 7-10, 1963
A. Glassner, Joyce Kopta, and D. Okrent, ed. Dec 63, 917p
Contract W31-109-eng-38
OTS $9.00

ANL-6840
Argonne National Lab., Ill.
REACTOR DEVELOPMENT PROGRAM. Progress rept. for Jan 64. 15 Feb 64, 103p
Contract W31-109-eng-38
OTS $2.25

TID-7672
Atomic Energy Commission, Oak Ridge, Tenn.
Div. of Technical Information Extension
NUCLEAR PERFORMANCE OF POWER-REACTOR CORES. ANS TOPICAL MEETING [HELD AT THE] JACK TAR HOTEL, SAN FRANCISCO, CALIFORNIA, SEPTEMBER 26-27, 1963. SPONSORED BY THE NORTHERN CALIFORNIA LOCAL SECTION OF THE AMERICAN NUCLEAR SOCIETY.
Feb 64, 469p
OTS $5.50

TID-8200(9th Rev.)
Atomic Energy Commission, Washington, D. C.
Div. of Reactor Development.
NUCLEAR REACTORS BUILT, BEING BUILT, OR PLANNED IN THE UNITED STATES AS OF DECEMBER 31, 1963. 25p
OTS $0.50

NAA-SR-MEMO-2658
Atomics International, Canoga Park, Calif.
PERMISSIBLE FUEL HEAT GENERATION RATES FOR OMRE SHIPPING CASK
R. C. Noyes. 14 Apr 58, 10p
Contract AT(11-1)GEN-8
OTS $1.10

NAA-SR-MEMO-3034
Atomics International, Canoga Park, Calif.
PRELIMINARY HEAT TRANSFER AND COOLING STUDIES FOR FUEL TRANSFER OPERATIONS
J. T. Ream. 1 Oct 58, 33p
Contract AT(11-1)GEN-8
OTS $3.60

BMI-1657(Del.)
Battelle Memorial Inst., Columbus, Ohio.
PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING NOVEMBER, 1963
Russell W. Dayton and Ronald F. Dickerson. 1 Dec 63, 71p
Contract W7405-eng-92
OTS $1.75

BMI-1659(Del.)
Battelle Memorial Inst., Columbus, Ohio.
PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING DECEMBER, 1963
Russell W. Dayton and Ronald F. Dickerson. 1 Jan 64, 60p
Contract W7405-eng-92
OTS $1.50

WAPD-T-1605
Bettis Atomic Power Lab., Pittsburgh, Pa.
MATERIAL REQUIREMENTS FOR LONG-LIFE PRESSURE VESSELS
B. F. Langer and W. L. Harding. May 63, rev. Jun 63, 35p Prepared in cooperation with Combustion Engineering, Inc., Windsor, Conn.
Contract AT(11-1)GEN-14
CONF-102-4
OTS $3.60

DESCRIPTORS: *Reactor materials, *Pressure vessels

American Society of Mechanical Engineers 1963 Winter Meeting, Philadelphia, Nov 63

WAPD-T-1571
Bettis Atomic Power Lab., Pittsburgh, Pa.
NON-CELL CORRECTION TO THIN CELL HOMOGENIZATION
N. R. Candelore and R. C. Gast. 1 May 63, 12p
Contract AT(11-1)GEN-14
CONF-39-56
OTS $1.60

American Nuclear Society Ninth Annual Meeting, Salt Lake City, Utah, Jun 63

DESCRIPTORS: Reactors, *Neutron flux distribution

NYO-9650
Engineering Research Labs., Columbia Univ., New York.
A PHOTOGRAPHIC STUDY OF BOILING FLOW
John H. Vohr. 25 Oct 63, 190p
Contract AT(30-3)187
OTS $2.75

EURAEC-701
FIAT, Turin (Italy)
FISSION GAS RELEASE FROM URANIUM DIOXIDE. Topical rept. on UO_2 Pellets Fabrication and Characterization
Ignazio Amato. 1 May 63, 26p
Contract 021-60-9-RDI
FN-E-34
OTS $2.60

DESCRIPTORS: *Uranium, *Oxides, *Powder metallurgy.

GAMD-2221(Rev.)
General Atomic Div., General Dynamics Corp., San Diego, Calif.
PROCEDURES FOR THE PREPARATION OF GRAPHITE MATRIX FUEL COMPACTS CONTAINING CARBON COATED $(Th,U)C_2$ FUEL PARTICLES
W. V. Goeddel. 15 Aug 62, 14p
Contract AT(04-3)314
OTS $1.60

DESCRIPTORS: *Uranium, *Thorium, *Carbides, *Reactor fuel elements

GEMP-231
General Electric Co., Cincinnati, Ohio.
630A. MARITIME NUCLEAR STEAM GENERATOR. Status rept. no. 1. 12 Sep 63, 278p
Contract AT(40-1)2847
OTS $3.50

CONF-63-4
General Electric Co., Cincinnati, Ohio.
PRIMARY KNOCK-ON SPECTRA AND POPULATIONS IN NEUTRON IRRADIATED BeO
J. R. Beeler, Jr., and J. W. Zwick. [1962] 13p
Contract AT(11-1)171
TM62-8-6
OTS $1.60

American Physical Society 1962 Summer Meeting, Seattle, Aug 62

DESCRIPTORS: *Beryllium, *Oxides, *Radiation damage

GEAP-4244
General Electric Co., San Jose, Calif.
APPLICATIONS OF STRAIN CYCLING CONSIDERATIONS TO SUPERHEAT FUEL DESIGN
G. F. Rieger. [Jun 63] 34p
Contract AT(04-3)189
OTS $3.60

DESCRIPTORS: *Reactor fuel elements,

GEAP-4294
General Electric Co., San Jose, Calif.
ECONOMIC COMPARISON OF FUEL FABRICATION PROCESSES USED IN THE HIGH POWER DENSITY PROGRAM
Robert B. Hoffman. 25 Jun 63, 34p
Contract AT(04-3)361
OTS $0.75

GEAP-3824
General Electric Co., San Jose, Calif.
FABRICATION COST ESTIMATE FOR UO_2 AND MIXED PuO_2/UO_2 FUEL
G. D. Collins. 24 Jan 62, 29p
Contract AT(04-3)189
OTS $0.75

HW-SA-2924
Hanford Atomic Products Operation, Richland, Wash.
HIGH TEMPERATURE RADIATION EFFECTS IN LAMPBLACK-BASED GRAPHITES
H. H. Yoshikawa. 3 May 63, 19p
Contract AT(45-1)1350
CONF-73-11
OTS $1.60

Sixth Biennial Conference on Carbon, Pittsburgh, Jun 63

DESCRIPTORS: *Radiation effects, Graphite

HW-79814
Hanford Atomic Products Operation, Richland, Wash.
INTENSITY OF BETA RADIATION AT THE SURFACE OF A FUEL ELEMENT
D. R. Dickinson. Jan 64, 18p
Contract AT(45-1)1350
OTS $0.50

HW-76008
Hanford Atomic Products Operation, Richland, Wash.
TESTS ON REACTOR HELIUM SEALS: PRTR INLET
D. H. White. Dec 63, 16p
Contract AT(45-1)1350
OTS $0.50

NYO-9774
Johns Hopkins Univ., Baltimore, Md.
THE TRANSPORTATION OF HIGHLY RADIOACTIVE MATERIALS. A review of current research
J. Trueman Thompson. Oct 63, 26p
Contract AT(30-1)1477
OTS $0.50

UCRL-7544
Lawrence Radiation Lab., Univ. of California, Livermore.
THORIUM BREEDER-REACTOR HISTORIES CALCULATED WITH GROM CODE
G. M. Benson. 21 Oct 63, 30p
Contract W7405-eng-48
OTS $0.75

LAMS-2427
Los Alamos Scientific Lab., N. Mex.
A RADIATION REACTOR CONCEPT (GLOWWORM)
L. D. P. King. Apr 63, 49p
Contract W7405-eng-36
OTS $1.25

DESCRIPTORS: *Reactors,

LADC-5218
Los Alamos Scientific Lab., N. Mex.
RATES AND MECHANISMS OF THE LOSS OF FISSION PRODUCTS FROM URANIUM-GRAPHITE FUEL MATERIALS
E.A. Bryant, G. A. Cowan, J. E. Sattizahn, and Kurt Wolfsberg. 12 Sep 62, 24p
Contract W7405-eng-36
OTS $2.60

DESCRIPTORS: *Graphite, Fission products,

MND-MD-2560-9
Martin-Marietta Corp., Baltimore, Md.
PM RESEARCH AND DEVELOPMENT PROGRAM. Quarterly progress rept. no. 9, 1 Apr-30 Jun 63
July 63, 104p
Contract AT(30-1)2706
OTS $9.10

DESCRIPTORS: *Uranium, *Oxides,

MLM-1182
Mound Lab., Miamisburg, Ohio
RADIOISOTOPES FOR HEAT SOURCES, I: CALCULATIONS FOR PREPARATION OF U^{232} BY IRRADIATION OF Th^{230} AND Th^{232}
K. W. Foster. 1 Jul 63, 12p
Contract AT(33-1)GEN-53
OTS $0.50

ORNL-3523
Oak Ridge National Lab., Tenn.
GAS-COOLED REACTOR PROGRAM. Semiannual progress rept. for period ending 30 Sep 63. [1964] 489p
Contract W7405-eng-26
OTS $5.50

IDO-16896
Phillips Petroleum Co., Idaho Falls.
ARMF II REGULATING ROD READOUT AND SHIM ROD DRIVE AND POSITION DISPLAY
R. L. Little. 25 Sep 63, 35p
Contract AT(10-1)205
OTS $0.75

PWAC-422
Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
THERMOCOUPLE DEVELOPMENT LITHIUM-COOLED REACTOR EXPERIMENT. 5 Mar 64, 158p
Contract AT(30-1)2789
OTS $2.75

DP-895
Savannah River Lab., Aiken, S. C.
HEAVY WATER MODERATED POWER REACTORS. Progress rept. Jan-Feb 64.
R. R. Hood, comp. Mar 64, 32p
Contract AT(07-2)1
OTS $0.75

DP-837
Savannah River Lab., Aiken, S. C.
IRRADIATION OF URANIUM DIOXIDE FUEL TUBES IN THE VBWR
Henry C. Quigley. Aug 63, 16p
Contract AT(07-2)1
OTS $0.50

DP-851
Savannah River Lab., Aiken, S. C.
NONDESTRICTUVE TEST STATION FOR ZIRCALOY-CLAD REACTOR FUEL
Leslie E. Goodwin and Herbert D. Hendricks. Oct 63, 19p
Contract AT(07-2)1
OTS $0.50

Waste Disposal

HW-79622
Hanford Atomic Products Operation, Richland, Wash.
FORMALDEHYDE TREATMENT OF PUREX RADIOACTIVE WASTES
R. C. Forsman and G. C. Oberg. Oct 63, 32p
Contract AT(45-1)1350
OTS $0.75

HW-71929
Hanford Atomic Products Operation, Richland, Wash.
PROPOSAL FOR FINAL DISPOSAL OF NPR CHEMICAL WASTE
W. D. Bainard. 5 Dec 61, 14p
Contract AT(45-1)1350
OTS $1.60

DESCRIPTORS: Disposal, *Wastes (Industrial)

HW-SA-2722
Hanford Atomic Products Operation, Richland, Wash.
RADIANT-HEAT SPRAY-CALCINATION PROCESS FOR THE SOLIDIFICATION OF RADIOACTIVE WASTE
Rudolph T. Allemann and Benjamin M. Johnson.
16 Aug 62, 25p
Contract AT(45-1)1350
OTS $2.60

DESCRIPTORS: Processing, *Radioactive waste.

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

AD-425 812
Aerospace Medical Research Labs. (6570th), Aerospace Medical Div., Wright-Patterson AFB, Ohio
ATTENUATION OF NONUNIFORM SUIT TEMPERATURES FOR SPACE SUITS IN ORBIT. Technical documentary rept.
Kenneth R. Cramer and Thomas F. Irvine, Jr. Sep 63, 15p
AMRL-TDR-63-80; N64-13653
OTS $0.50

DESCRIPTORS: *Pressure suits, *Flight clothing, Temperature control, Fluid flow, Space environmental conditions, Heat transfer, Statistical analysis.

A cylindrical model of a water jacket space suit exposed to solar and metabolic heating was examined to determine the water flow rates required to reduce large equilibrium suit temperature differences. Analytical results demonstrate that variations in the metabolic heating rate are unimportant and only moderate water flow rates are required to reduce the maximum suit temperature difference to a few degrees Fahrenheit. This is the third phase of an investigation to delineate the design parameters for controlling the thermal environment in a space suit located in an orbit around the earth. (Author)

PHYSICS

GA-4434
General Atomic Div., General Dynamics Corp., San Diego, Calif.
DIFFERENTIAL NEUTRON THERMALIZATION.
Annual summary rept. 1 Oct 62-30 Sep 63.
W. L. Whittemore. 15 Oct 63, 90p
Contract AT(04-3)167
OTS $2.00

LADC-5443
Los Alamos Scientific Lab., N. Mex.
CONCERNING THE SECOND ORDER ELECTRIC FIELD DUE TO A CONDUCTION CURRENT
Don A. Baker. [1962] 13p
Contract W7405-eng-36
OTS $1.60

DESCRIPTORS: *Electric fields

N64-13929
Massachusetts Inst. of Tech., Cambridge.
GASEOUS OPTICAL MASERS AND THEIR APPLICATIONS
A. Javan. [1963] 35p
Grant NsG-330
NASA CR-55276
OTS $3.60

Presented at the Materials Science Colloquium at Cornell University, Ithaca, New York, 5 Nov 63.

DP-878
Savannah River Lab., Aiken, S. C.
MOSSBAUER EFFECT IN FERREDOXIN
William L. Pillinger and John A. Stone. Jan 64, 15p
Contract AT(07-2)1
OTS $0.50

Electronics

N64-13191
Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
THE ADMITTANCE OF AN INFINITE SLOT RADIATING INTO A LOSSY HALF-SPACE
R. T. Compton, Jr. 15 Oct 63, 22p
Grant NsG-448
Rept no. 1691-2; NASA CR-55141
OTS $2.60

AD-273 531
Laboratories for Applied Sciences, Univ. of Chicago, Ill.
STUDY OF AERO SPACE WARNING AND CONTROL SYSTEM. VOLUME VII: DETECTION OF LASER RADIATION
Vincent J. Corcoran and Yoh-Han Pao. Jan 62, 46p
Contract AF33(616)7095
Rept. no. LAS-TR-190-13; ASD-TDR-62-69
OTS $4.60

DESCRIPTORS: *Early warning systems, Control systems, *Radiation measurement systems, *Detection, *Phototubes, *Lasers, Electromagnetic waves, Light, Photons, Noise (Radio), *Defense systems, Masers,

A laser detection system, as any detection system, is limited in range capability by fluctuations in the output of the detector that tend to mask the signal to be detected. The photoelectric detection of light is limited primarily by two effects: (1) shot noise, fluctuations in the rate of electron emission from the photosurface associated with the average intensity of the incident radiation; (2) photon noise, fluctuations which reflect the intensity fluctuations of the incident light. Before the advent of laser radiation the shot noise was the predominant effect that limited photoelectric detection; however, in laser detection photon noise can be the salient effect. In this paper the magnitudes of the fluctuations in electron emission associated with photon noise and shot noise and the parameters affecting these magnitudes are determined. Also, the influences of these fluctuations on the probability of detection and the attainable range of a laser detection system are investigated. (Author)

ORNL-3564
Oak Ridge National Lab., Tenn.
THERMONUCLEAR DIVISION. SEMIANNUAL PROGRESS REPT. FOR PERIOD ENDING OCTOBER 31, 1963.
[1963] 144p
Contract W7405-eng-26
OTS $2.25

MATT-137
Plasma Physics Lab., Princeton Univ., N. J.
THE EFFECT OF ION CORRELATIONS ON THE HIGH FREQUENCY CONDUCTIVITY AND EMISSION AND ABSORPTION COEFFICIENTS OF A FULLY IONIZED PLASMA
John Dawson and Carl Oberman. Aug 62, 15p
Contract AT(30-1)1238
OTS $1.60

DESCRIPTORS: *Plasma physics, *Electrical conductance, *Ions,

AD-287 986
Princeton Univ., N. J.
TURBULENT MIXING IN A PARTIALLY IONIZED GAS
Paul F. Jacobs. Oct 62, 138p
Contract Nonr-1858(31)
Aeronautical Engineering Lab. rept. no. 625; ARPA Order no. 206-61; N62-17619
OTS $10.50

DESCRIPTORS: *Plasma physics, *Turbulent flow, Argon, Helium, Differential equations, Temperature, Ionization, Gases, Integral equations, Numerical analysis.

Analytical and experimental studies of the axially symmetric turbulent mixing of a hot, partially-ionized subsonic argon jet with an annular subsonic cool hellium stream are presented. A model for the flow is developed and the resulting integro-differential equations are solved numerically on a high-speed electronic digital computer. Experimental results obtained from physical measurements at one-atmosphere pressure within the high-temperature arc-generated plasma are used to evaluate the analysis. Good agreement between analysis and experiment was observed. (Author)

SC-4938(RR)
Sandia Corp., Albuquerque, N. Mex.
A METHOD FOR OBTAINING RADIAL DISTRIBUTION FROM OPTICAL MEASUREMENTS ON CYLINDRICAL PLASMAS
W. B. Brooks and G. E. Reis. Dec 63, 18p
Contract AT(29-1)789
OTS $0.50

Solid State Physics

CONF-46-84
General Electric Co., Cincinnati, Ohio.
ENERGETIC ATOM TUNNELING IN A WURTZITE STRUCTURE
J. R. Beeler, Jr. and D. G. Besco. 8 May 63, 13p
Contract AT(40-1)2847
TM-63-6-5
OTS $1.60

American Physical Society 1963 Spring Meeting, Washington, D. C.

DESCRIPTORS: *Beryllium, *Oxides, *Crystals, *Crystal structure,

GAT-T-1054
Goodyear Atomic Corp., Portsmouth, Ohio.
THE LIKELIHOOD RATIO METHOD FOR THE PRECISE AND ACCURATE DETERMINATION OF LATTICE PARAMETERS FOR TETRAGONAL AND HEXAGONAL CRYSTALS
K. E. Beu, F. J. Musil, and D. R. Whitney (Ohio State Univ.) 6 Aug 62, 4p
Contract AT(33-2)1
OTS $1.10

N64-15897
Lockhead Missiles and Space Co., Sunnyvale, Calif.
ELECTROLYTIC PREPARATION OF HIGH DIELECTRIC THIN FILMS. Quarterly rept., 27 Sep - Dec 63
S. A. Ring. [1963] 31p
Contract NASw-765
NASA CR-55495
OTS $3.60

AD-403 352
Philco Corp., Lansdale, Pa.
STANDARDIZED INDIUM ANTIMONIDE INFRARED DETECTING CELL PROGRAM. Final rept. for 13 Oct 59-31 Oct 62, on Manufacturing Methods for Indium Antimonide Infrared Detectors
C. H. Sutcliffe. Nov 62, 98p
Contract AF33(600)40090
ASD-TDR-63-392
OTS $8.60

DESCRIPTORS: *Manufacturing methods, *Infrared detectors, *Indium alloys, *Antimony alloys, Photoelectric cells (Semiconductor), Joints, Diffusion, Electrical properties, Mechanical properties,

Methods of manufacturing photovoltaic indium antimonide infrared detectors with detectivities within a factor of two of the theoretical limit were developed. Detectors fabricated by these methods have demonstrated good electrical characteristics, thermal stability, and mechanical ruggedness. Studies of junction formation techniques proved diffused junctions superior to alloyed junctions. Four diffusants were tried and cadmium was found to be best, considering the combination of conversion efficiency, responsivity, uniformity, and stability. The depth of diffused junctions was found to be too great for maximum sensitivity, consequently a controlled surface etch was developed to obtain optimum junction depth. Of the sensitive area delineation techniques tried, mechanical masking proved best for this program. For higher production rates or more complex shapes, evaporation masking is recommended. A glass-metal-sapphire dewar was designed for the detector package. It met the vibration requirements of MIL-E-5400 and the temperature requirements of MIL-E-202. Glass encapsulated platinum leads integral with the package were used to eliminate lead generated microphonics. (Author)

N64-15388
Univ. of Southern Calif., Los Angeles.
OPTICAL CONSTANTS OF METALS IN THE VACUUM ULTRAVIOLET REGION
W. Steinmann, E. I. Fisher, and G. L. Weissler.
15 Jan 64, 49p
Grant NsG-178-61
NASA CR-55515
OTS $4.60

Wave Propagation

N64-15542
Alabama Univ. Research Inst., Huntsville.
GREEN'S FUNCTIONS FOR THE PARALLEL-WALL WAVEGUIDE
F. J. Tischer. Jan 64, 11p
Grant NsG-381
UARI Research rept. no. 13; NASA CR-55653
OTS $1.60

N64-14842
Stanford Electronics Labs., Stanford Univ., Calif.
ON THE DETERMINATION OF TEMPERATURE AND IONIC COMPOSITION BY ELECTRON BACKSCATTERING FROM THE IONOSPHERE AND MAGNETOSPHERE. Scientific repts. nos. 1 and 7
D. R. Moorcroft. Oct 63, 39p
Grant NsG-377; Contract AF19(604)7436
SEL-63-125; NASA CR-55434; AFCRL-63-798
OTS $3.60

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB-165 252
ITT Communication Systems, Inc., Paramus, N. J.
USAF 480L AIRCOM PROGRAM GENERAL DESIGN AND SYSTEM PERFORMANCE SPECIFICATIONS.
Revised 15 May 61, 156p
Contract AF19(626)5
Rept. no. B2071-TN-2; AFCCDD-TR-60-42; AD-254 817
OTS $11.50

DESCRIPTORS: *Military communications, *Space communication systems, *Air force communications, *National defense, *Secret communication systems, Reliability, *Air force operations, Data transmission systems, Specifications, *Radio communication systems, Control systems, Military requirements, *Voice communication systems, Communication equipment, Design, *Electronic circuits.

This document provides general design guide line and performance objectives for the United States Air Force Aerospace Communications Complex (AIRCOM). The system specifications defined herein are technical recommendations for modernization and extension of MIL-STD-188 to provide the guide lines for the development of long haul, high capacity, military communication systems. This general design and system performance specification defines the basic system concepts, standards, and design objectives which outline and guide, as well as reflect, the system and subsystem design recommendations. (Author)

PB-165 220
[Research Analysis Corp., McLean Va.]
FIELDS OF KNOWLEDGE AND OPERATIONS RESEARCH Staff paper. Jan 60, 89p
[Contract DA44-109-qm-266]
ORO-SP-124; AD-236 142
OTS $8.10

DESCRIPTORS: *Operations research, Scientific research, Research program administration, Job analysis, Scientific personnel, Reports, Political science, Military research.

During the November 1958-May 1959 Theoretical Panel Season, a series of presentations were given in order to understand fully the contributions of each discipline or field of knowledge represented at operations research office, Johns Hopkins U. to operations research. It was a starting thesis that each discipline makes a contribution peculiar to itself and only by understanding the nature of each discipline's contribution could each discipline be utilized to the fullest by all members of an operations research team. In addition, at the very outset some discussion centered about the question of what criteria were used in evaluating the types of people who could be most useful in operations research work. The present report represents the great majority of the presentations given during these Theoretical Panels. (Author)

AD-297 301
Research Analysis Corp. [McLean, Va.]
MODES OF INQUIRY AND RESEARCH TASKS FOR GENERAL SYSTEMS ANALYSIS. Technical paper
Nicholas M. Smith and Milton C. Marney. Dec 62, 21p
Contract DA44-188-ARO-1
RAC-TP-72
OTS $2.60

DESCRIPTORS: *Operations research, Research program administration, *Decision making, Control systems, Queuing theory, Scheduling, Industrial relations, Management engineering,

Any attempt to establish a general perspective for the special disciplines associated with general systems analysis must encompass the orientation of modes of inquiry and research tasks that couple functionally with a correspondent structuring of the field of phenomena. Such a project is attempted in this study under the conception that the range of general systems analysis is the domain of adaptive systems. Certain metascientific considerations indicate that an adequate treatment of this domain, particularly with respect to complex organizations, will require the exploitation of a potential innovation emerging from the current prototype of rational inquiry, i.e., the presently accepted model of scientific thought. Examination of successive historic modifications of scientific method reveals that the "conceptual" mode of inquire most recently developed in physical science presents the possibility of reinterpretation as a formal dual. That is, an "introspective" as well as an "extrospective" format ensues formally from the rational foundations of the conceptual mode of inquiry, and these dual perspectives of inquiry are shown to be complementary. This version of complementarity leads immediately to (1) a resolution of philosophical disputes that have heretofore blocked the development of a significant theory of value, and hence a general theory of decision; (2) an extension of the range of research generally conceived for operations research; and (3) a new structuring of research tasks under both formal and empirical divisions. (Author)

PB-165 219
[Research Analysis Corp., McLean Va.]
A PROPOSED COST-OF-RESEARCH INDEX. Staff paper
Ellis A. Johnson and Helen S. Milton. Feb 61, 20p
[Contract DA44-109-qm-266]
ORO-SP-142; AD-237 205
OTS $1.60

DESCRIPTORS: *Scientific research, Industrial research, Military research, *Economics, *Costs, Graphic analysis, Tables.

A cost-of-research index is proposed to provide a measure of the relative cost of the technical man-years supported by the research and development (R&D) funds expended yearly, as an indicator of the relative effort - in contrast to dollars - that has been put forth in U. S. R&D. The technical-man-year cost is derived by dividing the total annual cost of each particular R&D organization participating in the study by the number of scientific and technical personnel working in the organization. The cost index is based on 17 individual organizations, ranging in size from the most sophisticated R&D enterprises to relatively small laboratories and R&D divisions. The total is divided about equally

among industrial, private non-profit, university-government-contract, and Federal-Government-sponsored organizations. In actual costs per technical man-year by groups, the percentage increase from 1950-1958 ranges from 71-83%. In 1960 the national economy will invest approximately 4 1/2 times as many dollars in R&D as in 1950; however, the increase in technical-man-year effort is only double the 1950 figure. Of the 300,000 scientists and engineers employed in U. S. R&D in 1958, 78% were working for industry, 12% for the Federal Government, 11% for colleges and universities, and 1% for non-profit institutions. The R&D organizations emphasizing theoretical research tend to be among the smaller ones and in the lower-cost area. A major contributing element in the national up-swing in R&D costs throughout the past decade was the increase in salaries of scientific and professional personnel. (DDC abstract)

AD-266 998
[Research Analysis Corp., McLean, Va.]
SPONSORSHIP OF RESEARCH: A SURVEY OF SCIENTIFIC LITERATURE, 1920-1960. Technical paper
Helen S. Milton and Ellis A. Johnson. Sep 61, 34p
[Contract DA44-109-qm-266]
ORO-TP-42
OTS $3.60

DESCRIPTORS: *Scientific research, *Research program administration, Operations research, Reports,

SOCIAL SCIENCES

NAS NRC-1135
Maritime Cargo Transportation Conference, NAS-NRC, Washington, D. C.
INLAND AND MARITIME TRANSPORTATION OF UNITIZED CARGO. A COMPARATIVE ECONOMIC ANALYSIS OF BREAK-BULK AND UNIT LOAD SYSTEMS FOR MARITIME GENERAL CARGO FROM SHIPPER TO CONSIGNEE. 15 Nov 63, 98p
NAS-NRC $4.00

DESCRIPTORS: *Transportation, Merchant vessels, *Cargo, *Water traffic, *Economics, Analysis.

This study is intended to provide a method for economic comparison, develop and compare cost factors, and draw conclusions concerning the quantitative effects of major variables upon the comparative economics of break-bulk, container, and pallet systems. The study bases its comparisons upon the operation of a four-ship fleet between the two ports and apportions the pallet and container costs over the full shipper-to-consignee system. The limits of this study extend from storage in the domestic shipper's warehouse to storage in the overseas consignee's warehouse. Packaging costs are included. (Author)

PB-165 216
[Research Analysis Corp., McLean, Va.]
CHINA: AN AREA MANUAL. VOLUME II. CULTURAL AND POLITICAL BACKGROUND. Technical memo. on Project POWOW
David Nelson Rowe and Willmoore Kendall. 24 Apr 53, 388p
[Contract DA44-109-qm-266]
ORO-T-229; AD-124 516
OTS $21.00

DESCRIPTORS: *China, *Political science, *Culture, Education,

Contents:
Traditional ideologies; Social organization and social forces; Government and politics; Education; Literature; Communism and mass communications; Humor; Modes of dress; Art motifs; Etiquette; Superstitions; Proverbs, axioms, sayings, and saws; Traditional calendar; modern calendar; and traditional personages: real and imaginary.

PB-165 214
[Research Analysis Corp., McLean, Va.]
CZECHOSLOVAKIA: AN AREA MANUAL. VOLUME I. GEOGRAPHICAL, HISTORICAL, AND ECONOMIC BACKGROUND. Technical memo. on Project POWOW
David Nelson Rowe and Willmoore Kendall. Jun 55, 244p
[Contract DA44-109-qm-266]
ORO-T-300; AD-74 585
OTS $16.00

DESCRIPTORS: *Czechoslovakia, *Geography, *History, *Economics, *Political science, Handbooks, Military strategy, *Psychological warfare.

This is the first of three volumes of an area manual on Czechoslovakia written by a group of scholars familiar with the cultural development of the Czech and Slovak people. It is more designed to serve as prototype for experimental purposes to determine the best manner for compiling and publishing cultural, historical, and geographic background data believed to be essential if one is to wage an effective psychological warfare campaign against any given group or target area. Volume I is a broad survey of the geographical, historical, and economic factors which have molded present day Czechoslovakia and which thus are believed to have great influence on the attitudes, prejudices, etc., of the Czech and Slovak peoples. (Author)

PB-165 212
[Research Analysis Corp., McLean, Va.]
CZECHOSLOVAKIA: AN AREA MANUAL. VOLUME II. POLITICAL, CULTURAL, AND SOCIOLOGICAL BACKGROUND. Technical memo. on Study POWOW
David Nelson Rowe and Willmoore Kendall, eds.
Jun 55, 235p
[Contract DA44-109-qm-266]
ORO-T-300; AD-74 586
OTS $15.50

DESCRIPTORS: *Czechoslovakia, *Political science, *Culture, *Sociology, Handbooks, Military strategy, *Psychological warfare.

This is the second of three volumes of an area manual on Czechoslovakia designed to serve as prototype for experimental purposes to determine the best manner for compiling and publishing cultural, historical, and geographic background data believed to be essential if one is to wage an effective psychological warfare campaign against any given group or target area. This volume surveys the political, cultural, and sociological development: the development of political parties, ideological conflicts, the social and ethnic structure of Czech and Slovak societies, education, religion, literature, language, proverbs, and traditional personalities. (See also PB-165 214)

PB-165 225
[Research Analysis Corp., McLean, Va.]
THE DECISION-MAKING PROBLEMS OF THE ARMY. Staff paper
George S. Pettee. Dec 57, 46p
[Contract DA44-109-qm-266]
ORO-SP-40; AD-236 147
OTS $4.60

DESCRIPTORS: *Army operations, *Operations research, *Decision making.

The document comprises the substance of a talk delivered at the opening session of Course in Appreciation of Operations Research, given at the Command Management School, Fort Belvoir, 25 November 1957.

PB-165 224
[Research Analysis Corp., McLean, Va.]
HUMAN ACCURACY IN LOCATING FIRING ENEMY MACHINE GUNS. Staff paper
William Chace, William Doying, Thomas Johnson, Ronald Kim, and David Selis. Apr 58, 28p
Contract DA44-109-qm-266
ORO-SP-49; AD-236 151
OTS $2.60

DESCRIPTORS: *Armed forces operations, *Automatic weapons, Detection, Azimuth, Errors, *Combat noise, *Sensory preception, *Hearing, Position finding, Direction finding, Range finding, Small arms.

A study was made to determine the azimuth and range error of the unaided infantryman for locating enemy machine guns under simulated battle conditions. (Author)

PB-165 238
[Research Analysis Corp., McLean, Va.]
INFANTRY OPERATIONS AND WEAPONS USAGE IN KOREA, WINTER OF 1950-51. Rept. on Proj. DOUGHBOY
S. L. A. Marshall. Oct 51, 153p
[Contract DA44-109-qm-266]
ORO-R-13; AD-342
OTS $11.50

DESCRIPTORS: *Army operations, *Korea, *Military personnel, *Attitudes, *Weapons, Guns, Small arms, Automatic weapons, Recoilless rifles, Rocket launchers, Mortars, Grenades, Bayonets, Antiaircraft guns, Reliability, *Communication systems.

The operations of Eighth Army which formed the basis for this study were of the period of maximum reverse and then recovery. The report does not reach back to the initial period when troops were green and our commitments were so limited that there was seldom a chance for an equal fight on local ground. Nor does it extend forward into the period when the fronts became stabilized and positional warfare ensued. It focuses exclusively upon the campaign of the first winter in which 8th Army experienced its greatest and most prolonged stress; the conditions peculiar to that period provide the best opportunity for the clear profiling of weapons, tactical and leadership values in combat against the background of training methods and the armament program. The author of the report developed the post-combat company critique technique in Central Pacific Theater and then applied it in European Theater during World War II. He used the same general method in Korea, beginning with the November battle. The one major change for ORO purposes was that the method was amplified so as to include more precise detail on the logistics of the infantry fight and place primary emphasis on the fighting characteristics of the new enemy. The commentary is divided into three parts-the behavior of men in the use of weapons, the behavior of weapons as men use them, and the use of information in augmenting fighting power. (Author)

PB-165 221
[Research Analysis Corp., McLean, Va.]
KNOWLEDGE AND ATTITUDES CONCERNING CIVIL DEFENSE AMONG RESIDENTS OF THE WASHINGTON METROPOLITAN AREA, AUGUST 1958, Staff paper
John S. Edelsberg, Robert C. Ellickson, Donald L. Kripke, Loughlin F. McHugh, and Hugh B. Price. Sep 59, 106p
ORO-SP-114; AD-252 059
OTS $9.10

DESCRIPTORS: *Civil defense systems, *Public opinion, *Attitudes, Radiological warefare, Nuclear explosion damage, Warning systems, Survival, Education, *District of Columbia, Urban areas.

A survey was made to determine for the Washington area the present state of the public's preparedness for an enemy attack and its willingness to take protective measures. The Washington-area population recognizes that a nuclear attack on the city would be disastrous but does not consider such an attack imminent. In general the public's knowledge of protective measures for the family in the event of a nuclear attack is inadequate; few can name more than one protective measure that should be taken. The public has not made any preparation for protection against the effects of a nuclear attack although some expressed a willingness to provide themselves with measures of protection. The public supports the purpose of civil defense and expressed a desire for more information on civil defense. (Author)

PB-165 230
[Research Analysis Corp., McLean Va.]
THE PURGE IN OCCUPIED JAPAN. A STUDY IN THE USE OF CIVILIAN AGENCIES UNDER MILITARY GOVERNMENT. Technical memo on Project LEGATE
John D. Montgomery. 3 July 53, 385p
[Contract DA44-109-qm-266]
ORO-T-48(FEC): AD-43 381
OTS $21.00

DESCRIPTORS: *Military government, *Political science, *Japan, *Sociology, Economics.

One of the immediate problems confronting a military unit in an occupation is the removal of incriminated and politically undesirable elements from the indigenous government. In Japan this was achieved by a categorical "purge," carried out rapidly in order to create political conditions which would enable the army in occupation to make continued use of existing governmental and economic machinery. This operation in itself represents one of the largest wholesale changes in "elite personnel" ever deliberately undertaken. The present study was designed to provide exhaustive data on how this change in leadership was brought about, and what incidental effects accompanied it. The purge operation afforded an opportunity to study the mechanics of dealing with an occupied people on every plane of organized society - at the national level and in local governments, in politics, industry, and in the indefinable elements of community morale. The information gathered from this study may be useful both for military planning for future occupations and for training military government officers whose duties will require them to deal with various governmental units in an occupied nation. (Author)

PB-165 228
[Research Analysis Corp., McLean, Va.]
SOME CIVIL DEFENSE PROBLEMS IN THE NATION'S CAPITAL FOLLOWING WIDESPREAD THERMONUCLEAR ATTACK. Staff paper
Richard Bentz and others. Jan 57, 47p
[Contract DA44-109-qm-266]
ORO-SP-1; AD-119 132
OTS $4.60

DESCRIPTORS: *Civil defense systems, *Nuclear explosion damage, *Radioactive fallout, *Radiological contamination, Radiation hazards, *Survival, Rescues, Shelters, *District of Columbia, Urban areas.

An evaluation was made of postattack conditions in the greater Washington area in the event of a widespread thermonuclear attack in which Washington is hit, in order to (a) determine an area, free from hazardous amounts of nuclear radiation, to which any survivors might evacuate if the Washington area were rendered uninhabitable by the radiation and other effects, (b) calculate the amount of nuclear radiation and estimate the effects of debris and other hazards on the evacuation of people from shelter areas in the damage zones, and (c) determine the number of expected survivors from the blast, thermal, and accumulated nuclear radiation effects. (Author)

PB-165 223
[Research Analysis Corp., McLean Va.]
THE WORLD SITUATION IN HISTORICAL PERSPECTIVE. Staff paper
George S. Pettee. Jan 59, 51p
[Contract DA44-109-qm-266]
ORO-SP-80; AD-235 982
OTS $5.60

DESCRIPTORS: *Political science, *History, Sociology, *Foreign policy, *Culture.

This paper originated as a double lecture, presented at the Army War College, Carlisle, Pennsylvania, in August 1958.

Documentation

PB-163 749
Center for the Information Sciences, Lehigh Univ., Bethlehem, Pa.
NEW FOUNDATIONS FOR RETRIEVAL THEORIES. Rept. no. 4 on Study of Theories and Models of Information Storage and Retrieval
Donald J. Hillman. 12 Aug 63, 20p
NSF Grant G24070
OTS $1.60

DESCRIPTORS: *Information retrieval, Theory, Mathematical models, *Algebras, *Mathematical logic.

A new formalism is described and made available for the construction of retrieval theories. The theory of logical algebras upon which the formalism is based was selected to provide the best possible conceptual framework for the description of the actual behavior of retrieval operations. The framework was arrived at, in other words, on a posteriori grounds, by first considering the empirical environment of retrieval systems and user requirements, and only then seeking the appropriate theoretical structure for the systematic description of retrieval events. Throughout this work, attention was paid to one of the cardinal rules of scientific procedure, viz., that a science of retrieval must characterize general patterns to which individual retrieval phenomena of an empirical nature conform and by virtue of which their occurrence can be systematically anticipated. (Author) (See also AD-283 640)

PB-163 748
Center for the Information Sciences, Lehigh Univ., Bethlehem, Pa.
POSITIVE MODELS OF RETRIEVAL SYSTEMS AS SPECIES OF LOGICAL ALGEBRAS. Rept. no. 5 on Study of Theories and Models of Information Storage and Retrieval
Donald J. Hillman. 23 Aug 63, 25p
Grant NSF-G24070
OTS $2.60

DESCRIPTORS: *Information retrieval, Theory, Mathematical models, *Algebras, *Mathematical logic.

It is shown that the theories of Mooers and Fairthorne for the design of retrieval systems are not to be regarded as essentially different, but are instead sub-theories of a more general theory of system design. In addition, it is shown that the Positive Model P^P developed in Report No. 3 (AD-283 640) occupies a central position in this general theory, and forms the basis of a new retrieval system. This reorientation of the Positive Model is not only necessary for the sake of theoretical reorganization and unification, but leads to an intuitively satisfactory interpretation of the Model in terms of the relations between document definations and prescriptions. (Author) (See also PB-163 749)

PB-163 750
Center for the Information Sciences, Lehigh Univ., Bethlehem, Pa.
RETRIEVAL SYSTEMS FOR NON-STATIC DOCUMENT COLLECTIONS. Rept. no. 6 on Study of Theories and Models of Information Storage and Retrieval
Donald J. Hillman. 26 Sep 63, 65p
NSF Grant G24070
OTS $6.60

DESCRIPTORS: *Documentation, *Information retrieval, Theory, Mathematical models, *Algebras, Mathematical logic, *Subject indexing.

A detailed description is given of the algebras which, (a), provide the exact structural characterizations of descriptor files to be constructed, and, (b), define retrievability conditions in terms of the relations holding between all sets of documents generated by these descriptors. (Author) (See also PB-163 748)

UCRL-7557
Lawrence Radiation Lab., Univ. of California, Livermore.
IBM 1401 COMPUTER PRODUCED AND MAINTAINED LIBRARY CIRCULATION RECORDS
James H. Kennedy. 23 Jan 64, 8p
Contract W7405-eng-48
OTS $0.50

PB-163 933
Office of Science Information Service, National Science Foundation, Washington, D. C.
CURRENT RESEARCH AND DEVELOPMENT IN SCIENTIFIC DOCUMENTATION, NO. 1. Jul 57, reprinted Oct 61, 58p
OTS $5.60

DESCRIPTORS: *Documentation, *Information retrieval, *Data storage systems, *Machine translation, Molecular structure, Coding, Indexes, Language, Operations research, Display systems.

Descriptive statements of work in progress are arranged alphabetically by organization and a subject guide appears at the end of the report. Entries are classified broadly into the following groups: (1) Organization of Information, for studies of methods and systems for the analysis, ordered arrangement, and encoding of subject matter; (2) Equipment for Storage Retrieval, for research into and development of devices, whether manual, mechanical or electronic, for storing and recalling information; (3) Special Studies, for program dealing with study and analysis of information needs of scientists, fundamental concepts applicable to documentation studies, contributions of other fields to the solving of documentation problems, etc; (4) Mechanical Translation, for research and development of systems and devices for automatic translation of text from one language to another. (Author)

PB-163 934
Office of Science Information Service, National Science Foundation, Washington, D. C.
CURRENT RESEARCH AND DEVELOPMENT IN SCIENTIFIC DOCUMENTATION NO. 2
Madeline M. Berry, comp. Apr 58, 59p
Rept. no. NSF-58-20
OTS $5.60

DESCRIPTORS: *Documentation, *Information retrieval, *Data storage systems, *Machine translation, Molecular structure, Coding, Dictionaries, Indexes, Language, Libraries, Operations research.

Descriptive statements of work in progress are arranged alphabetically by organization and a subject guide appears at the end of the report. Entries are classified broadly into the following groups: (1) Organization of Information, for studies of methods and systems for the analysis, ordered arrangement, and encoding of subject matter; (2) Equipment for Storage and Retrieval, for research into and development of devices--manual, mechanical, or electronic--for storing and recalling information; (3) Special Studies for programs dealing with study and analysis of information needs of scientists, fundamental concepts applicable to documentation studies, contributions of other fields to the solving of documentation problems, etc; (4) Mechanical Translation, for research on and development of systems and devices for automatic translation of text from one natural language to another. (Author) (See also PB-163 933)

PB-163 935
[Office of] Science Information Service, National Science Foundation, Washington, D. C.
CURRENT RESEARCH AND DEVELOPMENT IN SCIENTIFIC DOCUMENTATION NO. 3
Madeline M. Berry and Barbara Haksteen, comp.
Oct 58, 73p
Rept. no. NSF-58-33
OTS $7.60

DESCRIPTORS: *Documentation, *Information retrieval, *Data storage systems, *Machine translation, Abstracts, Artificial intelligence, Molecular structure, Coding, Dictionaries, Indexing, Language, Libraries, Computer logic, Operations, Research.

Descriptive statements are classified under the five subject headings listed below. Each statement appears on the most appropriate heading, and is cross-referenced, if necessary, under others. (1) Information Requirements and Uses--for studies and analyses of information needs of scientists and their use of information; (2) Research on Information Storage and Retrieval--for studies of methods and systems of analysis, ordered arrangement, encoding and searching of subject matter, and for theoretical studies of information storage and retrieval; (3) Mechanical Translation--for work on procedures for automatic translation from one natural language to another; (4) Equipment Development--for development of devices for processing information, including reading, storing, searching, transmitting and translating devices; (5) Miscellaneous--for research and development that cannot be classified under any of the first four headings. (Author) (See also PB-163 934)

MISCELLANEOUS

PB-181 561
Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Apr 64.
OTS $1.25, $10.00/year

DESCRIPTORS: *Naval research, *Scientific research, Tunnel diodes, Ionosphere, Atmosphere, Chemistry, Liquids, Polarization, Amines, Carbon, Monoxides, Platinum, Lead, Calcium, Oxides, Electrolytic cells, Fire extinguishers, Pneumatic systems, Metallurgy, Ceramic materials, Refractory materials, Niobium, Cobalt, Nickel, Crystal growth, Pressure vessels, Steel, Protective treatments, Hydroxides, Sodium compounds, Aluminum, Nuclear physics, Electron guns, Electron beams, Radio, Buoys, Submarines, Ocean waves, Radar, Solid state physics, Single crystals, Sound, Transducers, Reports, Patents,

Contents:
Articles:
High-Current Tunnel Diodes, by D. M. Horan and P. E. V. Shannon
Recent NRL Contributions to Ionospheric Physics, by J. C. Holmes, C. Y. Johnson, and J. M. Young
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Atmosphere and Astrophysics: Irradiance from a light source located above the horizon
Chemistry: Surface potential and induced polarization in nonpolar liquids adsorbed on metals. Hydrolysis of oil-dispersed amine salts. Constant current pulses used to study adsorption and oxidation of carbon monoxide on platinum. Comparison of lead calcium and lead antimony cells designed for full float operation. Morphology of lead oxide in the positive plates of lead acid cells. Improved vacuum pneumatic system for filling large dry chemical fire extinguishers
Metallurgy and Ceramics: Defect structure in refractory metals. Effect of interstitial contaminants on the high-temperature mechanical properties of niobium. Determination of gases in cobalt. Evaluation of the perfection of nickel single crystals. Atomic kinetics of crystal growth. Effects of cyclic irradiation-annealing treatment on a reactor pressure vessel steel. Growth and breakdown of protective films in high-temperature (316°C) aqueous systems containing 15% sodium hydroxide. Effeciency of aluminum-base anodes
Nuclear and Atomic Physics: Modulator developed to supply 550 Mw to an electron gun used for studying very intense electron beams
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